SCONSET BEACH NOURISHMENT PROJECT

Proponent Responses Following Conservation Commission Meeting #1

The information included herein is intended to directly respond to questions asked at the Nantucket Conservation Commission meeting held on September 10, 2007 regarding the Sconset Beach Nourishment Project. At that meeting the Proponent, the Siasconset Beach Preservation Fund, and Project Team members were able to respond directly to many questions from the Commissioners. Meeting time constraints, however, prevented the Proponent from directly responding to many questions asked by the public and some of the questions from the Commission itself. Although many answers could have been provided at the meeting had there been sufficient time available, the Proponent hopes that these responses are helpful and informative.

In an effort to be thorough and comprehensive, this document includes questions and responses provided at the meeting itself as well as responses to questions that were left unanswered or required follow-up information. This information is organized according to the order in which questions were raised at the meeting. Where possible, the Project Team has identified the individual asking the question; we apologize if any names are incorrectly recorded here.

PRESENTATION 1: Nourishment Area Characteristics

1. Question (Rudin): Is the composite grain size of 0.83 mm skewed by including the coarse-grained surf zone material?

Response (Rits): Sediment samples were collected at several bank locations, upper, mid, and lower beach, and also in the surf zone. They were weighted according to the elevation at which they were collected. In addition, the 0.83 mm grain size was a typographical error; the correct mean composite grain size is 0.86 mm.

2. (Oktay): Why did you make shoreline change projections using rates calculated over only the last ten years, during which there have been several strong storms?

(Rits): Shoreline and top-of-bank retreat rates can fluctuate considerably, which is why CZM relies on long-term data while placing somewhat greater weight on more recent data. In Sconset during the 10-year period from 1995-2005, for example, the annual rate of unvegetated bank retreat was generally lower than the 15- and 48-year rates, while the annual rate of dune retreat was generally higher. In this context, the use of recent 10-year erosion rates in Sconset is appropriate because it provides a more accurate and relevant picture of the current actual trend.

3. (Oktay): The mean grain size in the composite is higher than the beach itself, which raises some questions. Will heavier fill from excavation area 1 be used first, followed by finer-

grained material from excavation area 2? Area 1 contains significantly coarser material, which could raise issues with beach compatibility.

As presented at the Commission meeting, the composite is a weighted calculation; most beach nourishment sediment will come from excavation area 1, which the contractor will likely excavate first. From an engineering aspect, the coarser-grained sediment from the northernmost excavation area performs (i.e., resists erosion) more favorably; it would be preferable to incorporate the larger grain size into the design beach so that segment of the Project is more robust. The 11.5% gravel from excavation area 1 (the northernmost excavation area) is actually quite close to the 10.9% gravel in the native beach.

Furthermore, while it is true that the natural beach has a composite mean grain size of 0.86 mm and the nourished beach will have a mean grain size of 0.92 mm, this difference is statistically small. This variation in grain size is not a significant difference for benthic species utilizing the wet portion of the beach, nor is it significant for piping plovers or other shorebirds. Benthic samples have been collected at the proposed Borrow Site and nearshore area. The substrate grain size preferred by representative species indicate that both the native beach and nourished beach support required habitat conditions: *Mytilidae spp.* (0.5-256.0 mm), *Oligochaeta spp.* (0.125-1.0 mm), *Spisula solidissima* (0.5-1.0 mm), *Nemertea spp.* (0.5-1.0 mm), and *Nephtys caeca* (0.0625-1.0 mm). Furthermore, piping plovers and other shorebirds utilize beaches throughout New England which contain a wide range of sediment grain sizes.

4. (Rudin): Some borrow sites have been eliminated because they are too fine-grained; it appears the current excavation area 1 may be too coarse-grained in comparison to the native beach.

(Rits): The surface of the beach already has some gravel in it, as does the eroding Coastal Bank. Beach erosion winnows out the finer-grained material naturally. The surface of the beach does contain a considerable amount of coarse-grained material.

5. (Oktay): The project will be changing the resource areas by placing fill characteristic of the Coastal Beach over areas that are currently Coastal Dune. I appreciate the presentation and explanation of the characteristics of the various coastal resource areas at issue here; my concern is whether the proposed borrow site is suitable given the characteristics of the resource areas.

The proposed Borrow Site material is an extremely close match to the native beach (see Question/Response #35 below). The mean grain size, median grain size, and sorting values of the beach and Borrow Site match very closely. Additionally, Coastal Dune sediment samples collected at the southern portion of Baxter Road and Codfish Park had a mean grain size very similar to the overall Coastal Beach. Historically the Coastal Beach is the main sediment source for these low-lying dune areas. Since the beach does

not contain a significant amount of fine material, the adjacent dune is made up of sediment that is very similar to what is on the beach. The Coastal Bank may occasionally contribute sediment (containing gravel and other poorly-sorted material) to the landward portion of dune during significant rainfall events, when there is substantial surface runoff-generated erosion. Any coarse material will, over time, be covered by additional windblown sand from the beach. As naturally occurs, sediments on the beach will be sorted in a cross-shore direction, with the gravel fraction concentrating within the breaking zone following construction (similar to the concentration of gravel that currently exists in the breaking zone).

PRESENTATION 2: Construction Approach

6. (Bennett): At the borrow site, what is causing the turbidity to spread from the dredge location?

(Spadoni): The dredge will be moving around the Borrow Site, but currents will also transport the turbidity (sediment in suspension in the water column). However, as we have previously described, the borrow site sediments have a medium to coarse sand grain size with less than 1% silt, therefore, any turbidity plume generated during the dredging operation will be very localized.

7. (Bennett): I spoke with the fisherman who drew the Exclusion Zone box, and he claims the box in your presentation is inaccurate.

(Spadoni): The box we depict in the presentation is by no means the "final" Exclusion Zone, but it is a depiction of the initial box which was presented to us as a hand sketch.

8. (Rudin): What will be the length of the pipeline approaching the beach, and how will you incorporate the Exclusion Zone?

The 30-inch-diameter submerged pipeline will be approximately 0.5 miles in length, with the exact length depending on the size of the contractor's equipment and bathymetry in the area of each pumpout location. As we explained at the Commission meeting, logistical constraints related to the pumping capabilities from the dredge make the Exclusion Zone initially proposed by fishermen infeasible for nourishing the Project. The Proponent will continue to work with fishermen to negotiate a solution.

9. (Oktay): How will construction equipment be refueled?

Consistent with standard methods and specifications for nourishment projects (including those constructed within national parks), the Project's contractor will refuel construction equipment from a fuel tank located on the beach. This fuel tank will be double-walled,

with the outer wall having a capacity equal to 110% of the inner wall's capacity. The fuel tank will rest on skids so the contractor can move it alongside the other equipment.

10. (Oktay): You said the hopper dredge will draft 30-35 feet. I like the collar idea for the pipe, but that is still impacting a resource area; on the beach, how far can the contractor pump?

As explained at the Commission meeting, we cannot specify exact pumping distances at this time since they depend on depth contours and vessel draft. However, the contractor can generally pump a total pipeline length of approximately one mile, which means the contractor could pump from 0.5 miles offshore and then approximately 0.5 miles in either direction once the pipeline reaches the shore. Contractors prefer to pump from a location as close to shore as possible while maintaining at least a 5-foot buffer between the bottom of the hopper and the seafloor. Vessel draft depends on the size of the hopper dredge. Project engineers anticipate the contractor will use medium-sized hopper dredges since few large hopper dredges are available and small hopper dredges would be impractical for this Project. When fully loaded, medium hopper dredges draft 22-26 feet and the largest hopper dredges draft 30-35 feet.

11. (Oktay): How long will dredging occur each day?

(Spadoni): With a hopper dredge, dredging will be episodic; a contractor will likely work approximately 2 hours to fill a medium-sized dredge. Work will ideally progress on a 4-hour cycle, with approximately 5 (perhaps more likely 6) daily visits to the Borrow Site.

12. (Oktay): Were the turbidity values shown from the 6600 (i.e., most conservative)?

Yes, field personnel measured turbidity values with a YSI 6600 multi-parameter probe.

13. (Oktay): What would be the maximum height of the dike?

(Spadoni): The height of the constructed dune would never exceed 16 feet.

14. (Rudin): Will this be a 24-hour operation, including bulldozers on the beach?

(Spadoni): Yes, Project construction will occur 24 hours a day, 7 days a week as conditions allow.

15. (Andrews): During the project, will actual turbidity be measured?

(Spadoni): Yes, turbidity will be measured and compared to the model projections and regulatory standards. Results will vary with changing daily conditions; the modeled conditions are intended to typify general conditions.

16. (Andrews): Will there be enough room at Hoick's Hollow to store all of the pipeline needed?

(Spadoni): The contractors will only store what the area has the capacity to hold at a given point in time; equipment will be brought to the beach as construction progresses.

17. (Andrews): We need turbidity data that depicts the same time of year as the proposed project activities.

On September 20-21, 2007 the Proponent conducted additional turbidity sampling at 108 locations offshore of the Project area to characterize background conditions within the timeframe of proposed construction. No samples were collected at the borrow site due to a failure of the sampling equipment. Conditions on both sampling days were relatively calm: on September 20, the average wind speed was 13.6 mph with a maximum of 22 mph and an average direction of 270 degrees; on September 21, the average wind speed was 10.3 mph with a maximum of 22 mph and an average direction of 330 degrees.

At each sampling location, field personnel slowly lowered a YSI 6600 multi-parameter probe through the water column until it reached the seafloor. Once the probe had touched the bottom, it was slowly raised back to the surface. Data were collected during both the descent and ascent of the probe. Since optical turbidity measurements tend to elevate when the probe contacts bottom sediment and significantly decrease when the probe is exposed to air, the analysis excluded data points collected within 0.5 meters of the bottom and 0.5 meters of the water surface.

In addition to the real-time turbidity sampling, field personnel collected 12 water samples for laboratory analyses of total suspended solids (TSS) (12 samples) and turbidity (3 samples) to verify the accuracy of field measurements. Alpha Woods Hole Labs performed these analyses. Laboratory TSS and turbidity as well as field turbidity values are presented in Table 17A below. Results of the laboratory analyses verified that data from the field sampling program were within acceptable limits.

Table 17A: A comparison of laboratory TSS and turbidity to field-measured turbidity.

Station	Depth	Distance Offshore (feet)	Lab TSS (µg/l)	Lab turbidity (NTU)	YSI Turbidity (NTU)
3	Top	750	8.7	-	6.8
9	Middle	1,100	3.7	-	2.4
17	Bottom	1,700	9.0	-	1.7

24	Top	2,300	8.7	1.78	3.0
27	Middle	750	7.7	-	6.3
40	Bottom	1,300	9.0	-	2.3
51	Top	2,000	9.7		0.79
55	Middle	1,450	11	1.22	1.6
75	Bottom	800	9.7	-	2.2
91	Top	1,250	5	-	2.8
100	Middle	1,550	4.3	-	0.47
115	Bottom	2,450	6.7	0.799	0.4

Data from field measurements were processed to determine an average and a maximum turbidity value representing the entire water column at each of the 108 sampling locations. To assess background turbidity relative to the shoreline, sample locations were divided into five (5) groups based on distance from shore: 500-1,000 feet offshore; 1,000-1,500 feet offshore; 1,500-2,000 feet offshore; and greater than 2,500 feet offshore. Average and maximum turbidity values for each group are presented in Table 17B:

Table 17B: Average and maximum background turbidity values relative to offshore position.

	Distance Offshore (feet)				
	500-1,000	**1,000-1,500**	**1,500-2,000**	**2,000-2,500**	**>2,500**
Number of Samples	31	31	24	18	4
Average Turbidity (NTU)	3.3	1.9	1.3	1.4	2.6
Maximum Turbidity (NTU)	17.4	24.6	6.6	12.1	50.7

These data indicate that during relatively calm conditions, average background turbidity throughout the water column was relatively low (1.3-3.3 NTU) while maximum

background turbidity exhibited a greater range (6.6-50.7 NTU). In many cases, the maximum background turbidity is equal to or greater than the predictions for maximum Project-induced turbidity modeled for both the Borrow Site and nourishment area. As a reminder, turbidity modeling assumed a very conservative silt content of 10% for the nourishment material; since the actual silt content of the Borrow Site material is only approximately 1%, Project-generated turbidity will most likely fall within the range of natural variability found offshore of the nourishment area.

18. (Bennett): Will this entire process need to be repeated every 5 years?

(Spadoni): To maintain the design beach, renourishment will likely be needed every 5 years, at least initially. Therefore, the first renourishment project would involve the placement of approximately 1.4 million cubic yards of advance fill, not the entire 2.6 million-cubic-yard volume of the initial nourishment effort.

19. (Oktay): What would happen if the project was limited to 12 hours per day?

(Spadoni): The Project could not be constructed in a single season.

20. (Smith): Regarding the construction equipment, what size will they be? Will they be LGP machines, or standard track machines?

(Spadoni): Contractors typically use standard track D6-D7 machines.

PRESENTATION 3: Shorebirds

21. (Bennett): You noted that you thought there would be more shorebirds present due to the attraction of baitfish nearshore; is this because baitfish are entrapped in the dredged material?

(Hartnett): Nourishment may result in more nearshore baitfish due to an increase in nutrients, not due to any entrainment in the dredged material.

22. (Andrews): What will be the grade of the design beach?

(Spadoni): The grade will be 1:10, which closely replicates the existing beach.

23. (Andrews): During a presentation at Woods Hole Sea Grant conference on beach nourishment, information was presented that certain slopes (possibly 1:10; I cannot recall the exact slope) was too steep for Piping Plovers; apparently Plovers have not done well on most nourished beaches because the grades have been too steep.

(Smith): Discussions at that conference were with respect to Duxbury Beach, where a sacrificial dune was first constructed with a much steeper face than 1:10; NHESP viewed that dune as too steep. The 1:10 slope proposed for this Project should not pose a problem for piping plovers.

(Hartnett): At least 6 months will separate the end of construction from the beginning of the following nesting season, so equilibration will have already somewhat lessened the slope of the nourished profile.

24. (Oktay): Allowing vehicular corridors within 100 yards of hatching eggs is risky; how close will vehicles be allowed to approach nesting areas?

(Hartnett): The 100-yard buffer we include in the management plan is directly from state guidelines; vehicular traffic will be limited.

PUBLIC QUESTIONS

25. (Josh Eldridge): Starting the project in the north contradicts the presence of nesting areas in the north; wouldn't it make more sense to sequence south-to-north?

(Hartnett): Construction sequencing is still being refined. Also, the northern access is at Hoick's Hollow, which is approximately 3,000 feet south of the nesting area. Further, while it is true that the Low Beach area has not been used for nesting in the past 2 years, it will probably still be managed as habitat area and we may not be able to work in this area during the potential window for nests and chicks.

(Smith): Contractors could stockpile sand in the northern portion of the Project template and then move it into the area of historic plover nesting after the birds have fledged. A south-to-north sequence would interfere with plovers nesting at Low Beach or the Town Sewer Beds. Stockpiling sand at the southern end of the Project could only occur just south of Codfish Park, which would require the contractor to move the stockpiled sand over a very long distance to Low Beach and the Town Sewer Beds after birds have fledged.

26. (Ernie Steinauer): How close to the northern nesting area would the pipe approach?

(Spadoni): The maximum pumping distance will probably be 0.5 miles laterally; if there is a concern with shorebirds, the pipe will have to be moved.

27. (Robert DeCosta): We are chasing a moving target; every time I try to nail down a detail, I am told there is no specific answer until the project bidding is complete. The exclusion zone box put in the presentation was nothing like the box I drew. Only a single meeting with fishermen was held in May, and there has not been a meeting since. I am going to send a

detailed letter to the Commission tomorrow detailing the fishermen's concerns. It is time we started hearing answers to our questions.

The potential Exclusion Zone we showed at the Commission meeting was our attempt to replicate the Exclusion Zone box that a fisherman provided to us in a hand sketch. This box does present a problem from a constructability standpoint.

We agree with Mr. DeCosta that the Proponent has held only one official meeting with fishermen at which all of the various parties were present in the same room. However, Mr. DeCosta's characterization of our interactions is misleading. Members of the Project team have held numerous meetings on an individual or small group basis with fishermen, and on three separate occasions the Project's potential dredge contractors have traveled to the Project site onboard various fishermen's boats to learn about the area and answer any questions. SBPF has also engaged John Pappalardo, a policy analyst with the Cape Cod Commercial Hook Fishermen's Association, to interface with the fishermen in an attempt to resolve some of their expressed issues. Mr. Pappalardo has spent at least 11 days on-island holding meetings in an effort to make progress.

28. (Edie Ray): One of the facts stated was that no Plovers or Terns have been seen nesting in the central portion of the project over the last 7 years; I personally documented Least Tern eggs near where the Moby Dick pool comes down to the beach within the last 7 years. A least tern colony (6 pairs) clearly nested near the Summer House area, though the nests failed.

The Project Team has requested the location of the nesting colony and year of sighting from Ms. Ray and the Conservation Commission, and this information will be incorporated into our records and figures. Documentation of this nest was not included in the Town of Nantucket's Annual Beach Management Plan Reports we received from the Town of Nantucket (years 1996-2004). This may have been omitted due to the failure of this nest.

From Ms. Ray's description at the meeting, it appears that the nests were located just south of where the beach and dune nourishment template ends (i.e., between Codfish Park and Low Beach). Thus, while it is important to include this colony location in our data, it does not invalidate our statement that the majority of the Project area does not include historic nests. Despite these conditions, should a nest site become established anywhere in the Project area, the existing construction-period Shorebird Management Plan contains monitoring protocols and protective measures.

29. (Edie Ray): How might a wider beach affect birds that re-nest downdrift of your project?

The existing sand transport system is extremely dynamic and is characterized by constant changes along the shoreline. The proposed beach nourishment Project will provide an injection of sediment into the littoral system beginning in June, when Piping Plover (and possibly Least Tern) nests have already been established. Due to the time lag between nourishment and the transport of nourishment material outside the Project area, it is not

expected that there will be any significant impact on adjacent areas which may contain nests during the overlap between initial construction and potential shorebird activities (June-November). After construction is completed in November, the beach will have 6 months to equilibrate prior to commencement of the following nesting season. Beach areas adjacent to the Project may widen by up to 40 feet over 5 years due to natural sediment transport from the nourishment area; this beach expansion, however, is not expected to adversely impact shorebirds but, rather, will expand the area of available suitable habitat.

30. (Edie Ray): Least Terns feed by sight; have you calculated the impacts of nearshore turbidity on feeding shorebirds? A 100-yard buffer is a *minimum* buffer, and that distance can be increased to meet the needs of the particular population involved.

In the waters surrounding Nantucket, Least Terns primarily prey upon Sand Lance, which are only accessible when they come to the surface either naturally or when chased by predators. Sand Lance are most visible when they break the surface, at which time they generate a distinctive sound that resembles rain. As a result of this typical behavior, Sand Lance are clearly visible to Least Terns under most turbidity conditions. Least Terns do forage in the surf zone where turbidity will be greatest (as it is under natural conditions as well), but they also forage in the nearshore. As shown in Figures 7-10 of NOI Appendix G, conservative modeling indicate that Project-generated turbidity will dissipate to low levels within 200-300 feet of the nourishment shoreline and within 400-700 feet downdrift along the shoreline. In summary, we do not feel that localized, Project-induced turbidity will be at a level or duration that will adversely affect Least Terns.

The Project Team agrees with Ms. Ray's characterization of the 100-yard buffer as a minimum. Pursuant to state guidelines, and as acknowledged in the Project's NOI, the Proponent will increase the width of this buffer if chicks move outside a 100-yard range of their nests.

31. (Edie Ray): How many hours will you physically be on the beach monitoring during each monitoring session? This is important because the birds come and go and it can be easy to miss them. At the northern end of the project where there is possible overlap with plover nests and a tern colony, a plover chick was run over and killed this past season; chicks can move vast distances over the beach, and when I worked for the Town I was stationed at Jetty Beach. Plovers from in front of the concession stand were found all the way down to the last bulkhead, and they had traveled this distance over mere hours; least terns are more apt to stay put. I would like to put my concerns in writing and submit them to the Commission.

When Piping Plovers arrive in the early spring and begin to set up territories and court, they are conspicuous and vocal. SBPF protocols dictate that monitoring will occur twice weekly between mid-March and mid-July (20-22 pre-construction monitoring sessions); since construction will begin in June, these protocols should adequately document the

presence of courting and nesting Piping Plovers. If shorebirds are present, post-construction monitoring will increase to 3 times per week and the Proponent will implement its Shorebird Management Plan, which was developed with guidance from town, state, and federal shorebird managers.

32. (Ernie Steinauer): In the past, the SBPF monitor has only gone as far north as Hoick's Hollow; I would suggest the monitoring should be expanded north of Hoick's Hollow.

(Hartnett): Monitoring will extend north of Hoick's Hollow to ensure overlap with the area monitored by Mass Audubon.

33. (Doug Smith): My concern is with the 1-mile maximum pumping distance of the aggregate, which means there would be a minimum of 6 pumping stations. I would like some clarification of this, since I have only seen two pumping stations depicted.

Pumpout stations will be located at the seaward end of the submerged pipeline at distances from shore that depend on the contractor's specific equipment and the local bathymetry. Some dredges have a shallower draft and thus can approach closer to the shoreline; please see Question/Response #10 for additional information. Since sediment can typically be pumped one mile, locating the pumpout station 0.5 miles from shore will allow for a total pumping distance of approximately 0.5 miles along the shore from where the pipe comes onto the beach. The initial placement of pipe along the beach would allow the contractor to pump approximately 0.5 miles north along the beach. The pipe could then be reconfigured to pump to approximately 0.5 miles to the south without changing where the pipe emerges onto the beach or the location of the pumpout station. This would allow a single pumpout station to provide sediment to as much as one mile of beach, necessitating 4-6 pumpout locations for Project construction.

34. (Matt Reinemo): We are concerned that this is a big experiment and is a "horrible" idea that only *might* work. If this is an experiment, it should be performed where the environment is not so fragile.

Other beach nourishment projects have been successfully implemented in Massachusetts, and such projects are not a new or untested approach to controlling beach erosion. On the contrary, for decades beach nourishment has been used extensively around the United States and throughout the world. Engineering principles have been adopted based on scientific data and lengthy experience with, and study of, numerous projects which have been constructed and renourished.

Regarding the Sconset Project, in addition to performing extensive biological, geological, and hydrological investigations to thoroughly characterize existing conditions, the Proponent has engaged an experienced Project team and gathered a breadth of information from nourishment projects performed elsewhere to optimize the design.

Given the quality and volume of data, resources, and expertise invested in this effort, the Proponent is confident that the proposed activities will achieve the necessary objectives while minimizing adverse impacts and protecting valuable environmental assets. While unforeseen impacts are possible with any project, the Proponent is committed to extensive monitoring and will, should it become necessary, adopt corrective measures and mitigate for such impacts.

35. (Jennifer Eldridge): The only sediment characteristic you discussed was grain size; I understand that density is also important. As I understand it, sand from a borrow site may be less dense, allowing certain organisms to burrow into it. I request the Commission order rigorous testing of sand density, not only grain size.

In addition to mean grain size, the Proponent has evaluated sediments in terms of composition, sorting, and percent silt; data are presented in the table below. Based on these data, the sand fraction is extremely compatible between the native beach and the Borrow Site. Overall composition of sediment from both areas is predominantly rounded quartz grains with a low percentage of rounded feldspar grains, some shell fragments, and trace amounts of heavy minerals such as magnetite and ilmenite. Native beach sediments and borrow site sediments were derived from the same glacial outwash source material, and have been reworked by wave energy along the east-facing portion of Nantucket.

In addition to exhibiting a compatible composition, sediments at the native beach and Borrow Site have a similar sorting value (1.61 and 1.57, respectively). These sorting values classify sediments from both areas as poorly–sorted, which means there is a wide distribution of different grain sizes throughout both areas. This characteristic results in sediments with a lower overall porosity relative to well-sorted sediments, since smaller grains will fill the interstitial spaces between larger ones.

In terms of silt content, Borrow Site sediments are composed of approximately 0.95% silt while the native beach has a silt content of approximately 4.2%; although the silt content of the Borrow Site is lower, it is still very compatible with the native beach. All data related to composition, grain size, sorting values, and silt content demonstrate that sediments at the Borrow Site are comparable to sediments at the native beach; thus, the Borrow Site contains extremely compatible sediment for the nourishment Project.

Table 35A: Sediment characteristics of the native beach and Borrow Site.

Location	Mean Grain Size (mm)	Mean Grain Size (phi)	Sorting	% Silt
Native Beach	0.86	0.22	1.61	4.2

Borrow Site	0.86	0.21	1.55	1.0

36. (Emily Moulden): What is the proposed plan for the dewatering system that is still in place?

Following completion of Project nourishment, the Proponent will repair and extend the existing dewatering systems at Codfish Park and Lighthouse South-South. All proposed maintenance and repairs of the existing dewatering systems will be submitted to the Commission as part of a separate filing. The majority of the dewatering systems located at Lighthouse North (LHN) and Lighthouse South (LHS) have been removed; any remaining components of these systems will be removed immediately after completion of the nourishment Project.

37. (Emily Moulden): How much pipeline needs to be laid underwater approaching shore? Perhaps the applicant could provide a diagram showing bathymetry and the locations of the pumping stations.

The length of the submerged pipeline depends on the equipment a contractor has available at the time of bidding and construction as well as the water depth at and around each pumpout station. Therefore, the Proponent cannot provide an exact length of the submerged line at this time. Different dredges obviously have different drafts, a characteristic which affects how close the vessels can approach the shore, and bathymetry at each pumpout station is a critical factor. Nonetheless, based on available bathymetric data and assuming the most likely characteristics of the equipment feasible for this Project's construction, Project engineers anticipate that pumpout stations will be located approximately 0.5 miles offshore.

For any given piece of dredge equipment, there is a maximum total length that the dredge can pump. While this varies from dredge to dredge, contractors try to minimize the length of submerged line since this increases the distance they can pump alongshore. Increasing the feasible length of onshore pumping increases construction efficiency by reducing the frequency at which the contractor must move the submerged line.

Potential Project contractors have indicated to the Proponent that the approximate maximum pump length is one mile, and that the dredge will have to be located approximately 0.5 miles offshore. This scenario would require the use of up to six pumpout stations. However, the dredge Exclusion Zone proposed by fishermen exceeds one mile in length, which would prevent the contractor from filling the beach near the central section of the Exclusion Zone. If such a large dredge Exclusion Zone had any chance of being feasible, the contractor would have to be able to angle the submerged pipeline

across the exclusionary area, since mechanical filling (i.e., using dump trucks) is not feasible given the large volume of fill and short construction time period available.

A single submerged pipeline, relocated as needed, can be used to construct the project. After filling one section of beach, the contractor will float the pipeline by capping each end and pumping air into the line; while it is floating, the contractor will move the pipeline to the next location, where air will be released and the pipeline will sink to the appropriate location on the bottom. The contractor will perform any pipeline relocation activities during calm weather. Due to the exposed nature of the Project area, the contractor may be equipped with two submerged lines so the alternate pipeline can be placed during optimal conditions without interrupting the construction schedule. Once in place, the submerged lines will not interrupt fishing activities. They are only 30 inches in diameter, and pipeline collars will keep the lines elevated off the cobble bottom.

38. (D. Anne Atherton): You did compare the mined sediment to beach material based on grain size; however, I am interested in hearing about the composition of the sediment. Please explore that in a bit more detail.

Please see Question/Response #35.

39. (D. Anne Atherton): You said that "enhanced sand supply will benefit adjacent shorelines." This subjective statement should be supported by data. All of today's comments relate to conditions within the project area, but impacts extend outside this immediate area. It would be helpful if the Commission tried to gather more information about the sediment transport system beyond just the project area.

Sediment transport estimates outside of the project limits were developed in Attachment A of the FEIR. Predicted shoreline locations were also shown in FEIR Figure 11.

There will be no change to the underlying sediment transport in the area due to Project construction. Currently, sediment is transported both north and south away from the Project area. Modeling shows that these conditions will persist following construction of the nourished beach. The increase in shoreline width to the north and southwest of the Project area is due to increased sediment fill diffusing into these adjacent areas. Diffusion is the movement of sediment outside of the Project area due to the "bump" that is created in the position of the shoreline as a result of the Project. This volume is greater than the normal volume of sand that would be transported by natural processes in the absence of the Project.

Diffusion losses from the Project volume are estimated at 400,800 cubic yards over the Project's five-year design life, which is approximately 15% of the total Project volume and 27% of the projected five-year losses. This additional material will be distributed over an ever-lengthening portion of beach as transport to the north and south continues over

time. We have presented this as a benefit because there are no nearshore cobble resources north or south of the Project that could be impacted by this additional sand transport. Therefore, the addition of clean, beach-compatible material will result in the natural growth and widening of adjacent beaches, thus providing greater protection to upland properties and expanding the nesting habitat available to shorebirds.

40. (Brian Sullivan): With reference to the construction schedule, what is the extreme weather situation in which equipment cannot operate? Where will equipment go during extreme weather events? If the project cannot be completed in the single season, will all equipment be brought back to finish the project?

(Spadoni): If there is a weather situation created by high seas, the hopper dredge and other vessels will seek shelter in port and will return to the Project area to continue construction when conditions allow. As an example, equipment will not be able to operate in 8-9-foot seas, while 5-6-foot seas are marginal. Project engineers have built weather contingencies into the anticipated construction schedule based on historical records for sea state.

41. (Pete Kaiser): This area is very sensitive for fishing. I am a bit appalled at the proposal involving a hopper dredge that must approach within 0.5 miles of the project beach. This is known as the "hot zone" that contains some of the best fishing in the region. Props within 8-10 feet of the bottom could generate significant prop scour impacts, and the Commission should listen to the fishermen who are the present and future stewards of the water.

By maintaining a workable Exclusion Zone applicable to hopper dredge operations, the Proponent will protect the most valuable habitat as identified by fishermen. In addition, the contractor will at all times maintain at least five feet between the bottom of the dredge and the seafloor to minimize the potential for damaging prop scour; although energy from the prop may cause some short-term sand suspension, it will not be great enough to disturb cobble. Therefore, since sand is actively and naturally redistributed by local hydrologic conditions characterized by dynamic waves and currents, hopper dredge operations are not expected to adversely impact fisheries habitat. Due to these naturally-dynamic conditions, the area is inhabited by rapid colonizers and organisms adapted to disturbance; therefore, although energy from the prop may impact vegetation in localized areas, any such effect will be temporary and accompanied by the expectation of rapid recovery. Construction-period and post-construction monitoring will document any actual impacts and identify any unanticipated impacts, should they occur. The Proponent will provide mitigation for anticipated permanent cobble coverage and will augment that mitigation if any unanticipated additional permanent impacts are found during monitoring.