Barnegat Inlet to Little Egg Inlet, Long Beach Island Hurricane and Storm Damage Reduction Project: Questions from the LBI Joint Tax Payer Association

The following Long Beach Island Hurricane and Storm Damage Reduction Project Questions were presented to the Corps by Mr. Peter Trainor :

1. PROTECTION and SAFETY

Feasibility Report Topic 4.2 Planning Constraints
Economic Constraints states that
(a) Analysis of project benefits and cost should be conducted in accordance with Corps of Engineers' guidelines and must assure that any plan is complete within itself, efficient and *safe*, and economically feasible in terms of current price.
Environmental Constraints
(a) Consideration should be given to public health, *safety*, and social well being, including *possible loss of life*.

Concerns

1.1 Will the project design protect Long Beach Island from storms similar in intensity and duration as the: March 1962 "Five High" storm, the 1944 hurricane and the 1992 storm?

Response: The Long Beach Island Hurricane and Storm Damage Reduction project will reduce damages from low frequency/high intensity storm events over the life of the project.

1.2 What is the difference in the level of storm protection between 18 foot high dunes and 22 foot high dunes?

Response: The LBI Project is a Hurricane and Storm Damage Reduction project; it is based on an analysis of reduced damages versus costs. An 18 foot high dune is at or below the average dune height existing across Long Beach Island, and therefore represents a level of damage reduction at or below the without project condition. The without project condition is analyzed and used as the baseline from which the damage reduction benefits of all analyzed alternatives are computed against.

1.3 Will the flat beach extension create a hazardous drop off?

Response: No, a drop off is not anticipated at the flat beach extension. Scarping of the dry beach at the flat beach berm of all beaches, natural or nourished, typically occurs after large storms and increased wave energy at times of extreme high tides.

1.4 Will the drop off correct itself to a safer level?

Response: A drop off is not anticipated. If a scarp occurs due to storm activity, typically the beach will correct itself over a number of tidal cycles through wind and wave action. In the case of an extreme scarp in response to a large storm event, the township may have to use mechanical means to smooth it out. The overall project template is expected to replicate the shape of the existing beach in the nearshore.

1.5 If the drop off corrects itself, what is the projected time line when the drop off will be at safe level for bathers?

Response: A drop off is not anticipated. If one occurs due to storm activity, typically the beach will correct itself over a number of tidal cycles through wind and wave action. In the case of an extreme scarp in response to a large storm event, the township may have to use mechanical means to smooth it out.

The mention of bathers in your question implies that you are inquiring about the portion of the beach under water, the sub-aqueous portion of the beach profile. The overall project template is expected to replicate the shape of the existing beach in the nearshore. Adjustment is expected to occur over the first winter season.

1.6 Please confirm the slope of the drop off in any case.

Response: A drop off is not anticipated. Construction slopes extending into the water are not expected to be steeper than 1:15. In the sub-aqueous portion of the profile, the slope after initial construction will be gentler than the existing beach slope.

1.7 Are the swimmers and surf riders at risk if the berm is carved away creating cliffs that reflected incoming waves and surges sending a rush of water back to the sea?

Response: Any scarping that may occur immediately after construction or during profile adjustment would be temporary. Scarping would be limited to the upper beach profile (above the Mean High Water line) and would not cause hazardous swimming conditions nor cause any increase in wave reflection.

1.8 How long will it be before the new beach profile causes the shoreline recedes and gradually expose buried jetties creating a safety hazard? Greatest danger is when the jetties are not visible to the naked eye.

Response: We anticipate that a majority of the groins covered during initial construction will become exposed within the first year as the project adjusts to the design shape. The

presence of the project does not present a greater risk than occurs naturally.

1.9 Will the perpendicular public access provide a dangerous channel of water from a storm surge?

Response: The perpendicular public access is from the Street to the landward edge of the project, and will have no impact on the damage reduction provided by the project dune. The project design includes Dune crossovers that are constructed from the landward edge of the project template up the back slope then across the crest of the dune and then down the seaward face of the dune and will not create low areas for channels of water.

1.10 Is the slope to and from the crest of the dune greater than 03% and if so would this slope create a danger particularly for the handicapped?

Response: The slope of the design from the crest of the dune will be at a 1 V (vertical) to 5 H (horizontal), the existing dunes across LBI are currently at a steeper slope of 1V to ~ 2.5H. Furthermore, in accordance with Uniform Federal Accessibility Standards, The handicap crossovers included in the project are designed with a maximum slope of 1:12 (8.3%), with a maximum length between landings of 30 feet.

2. FLAT BEACH

Feasibility Report Topic 4.2 Planning Constraints
Technical Constraints states that
(a) Federal participation in the cost of restoration of beaches should be limited so that the proposed beach will not extend seaward of the historical shoreline of record.

Concerns

2.1 Why does the predicted post construction shoreline go seaward beyond the 40 year historic shoreline?

Response: The technical constraint relates to the historical record, which for Long Beach Island dates back to 1836, not just the last 40 years. The average position of the shoreline over the historical record is well seaward of the design shoreline.

2.2 Why did the design depart from the Technical Constraint?

Response: The design does not depart from the technical constraint

3. ECONOMICS

Feasibility Report Topic 4.2 Planning Constraints
Economic Constraints

Economic constraints limit the range of alternatives considered in the Feasibility Report. One of the constraints required that the economic benefit of the project must be equal to or greater that the project cost (benefit to cost ratio).

Concerns

3.1 Was the benefit to cost ratio the deciding factor on determining the project design?

Response: Maximizing net benefits is the metric used to determine the selected plan for Hurricane and Storm Damage Reduction Projects.

3.2 Does the benefit to cost ratio developed in 1999 reflect the 2006 condition?

Response: The BCR is updated periodically for inflation and price level increases. A limited reevaluation of costs and potential benefits are made to check for projects that have a delay in expected construction start. The LBI project was re-evaluated during fiscal year 2004, at the May 2004 price level. During this economic update it was found that the current conditions in the study area do not significantly differ from the conditions prevailing at the completion of the feasibility report analysis; the amount of affected infrastructure and structures has not significantly increased as the majority of lots had been developed. If anything, we are being conservative in that many of the smaller older homes have been replaced with larger newer homes that would have higher replacement costs and presumably content losses, and some of the municipal infrastructure has been upgraded, streets, utilities etc. In 1999, the Average Annual Benefits were $10,615,000 and Average Annual Costs were $5,771,000 resulting in a BCR of 1.8. In the 2004 analysis, the Average Annual Benefits were $13,283,000 and Average Annual Costs were $6,948,000 resulting in a BCR of 1.9. The selected plan BCR increased slightly from 1999 to 2004.

3.3 Specifically what factors escalated the projected initial project cost from $52 million in 1999 to $71 million in 2006?

Response: General Price level increases from 1999 to 2004, continued recession of the existing shoreline, and the fact the original cost estimate for initial construction did not include a cost for advanced nourishment that is required to offset predicted average shoreline recession over the first 7 year periodic nourishment interval. All of these increased costs were included in the 2004 economic update.

3.4 How will costs in excess of $71 million be addressed?

Response: Currently the best working estimate of initial project costs is approximately $71 million dollars based on the current price levels and a conservative discount rate of 7%. The PCA agreement dictates a limit to funding for initial construction and periodic nourishment that is adjusted for price level increases and inflation. Once that threshold is passed the Corps must notify the non federal sponsor and further construction must halt until a new PCA is approved by USACE-HQ and the additional funds authorized by Congress. The new PCA must then be accepted and signed by the non-federal sponsor and the Corps before construction can be completed.

3.5 Will you provide cost escalation accounted for on an annual basis from September 1999 to July 2006?

Response:
LBI BCR @ 7% Discount Rate, July 2006 Price Level:
Average Annual Benefits: $13,637,000
Average Annual Costs: $ 7,560,000
BCR: 1.8
Avg. Ann. Net Benefits: $6,077,000

3.6 What options will be considered if the current benefit to cost ratio is less than 1?

Response: **N/A, Corps projects must exceed 1.0 in order for it to be recommended for construction.**

3.7 Was the final 22 foot dune construction elevation predicated upon the level of protection or upon achieving a better economic justification of the project?

Response: The LBI Project is a Hurricane and Storm Damage Reduction project; it is based on an analysis of reduced damages versus costs. Corps regulations require us to recommend the plan to Congress for authorization that has the highest annual net benefits in the form of reduced damages over the 50 year period of economic analysis, which is shown to posses a positive benefit to cost ratio. This is considered the National Economic Development, (NED), plan. The 22-foot high dune with the 125-foot berm width alternative was found to be the NED plan for the Long Beach Island project. This was the plan ultimately supported by the local municipalities, the non-federal cost sharing partner, (the NJDEP), and authorized by Congress for construction by Section 101 (a) (1) of the Water Resources Development Act of 2000, Public Law 106-541.

3.8 What role does "cheapest" play in the determination of the quality of sand to be placed on the beaches?

Response: None, When discussing sand "cheapest" or "costliest" usually refers to the cost of transporting the sand from the borrow site to the location while quality is connected to "suitability" or the comparative analysis between the native material on the beach to the borrow area and its quality for construction purposes in the project area. In a beachfill dredging project the costs per cubic yard of sand increases as the distance between a borrow location and a placement location increases. Sand dredged from an offshore dredging location does not cost more based on an assessment of its quality, but it does cost more when you pump it greater distances, which impacts the BCR and maximizing net benefits.

3.9 To what degree will the Americas with Disability Act requirements for public access increase project costs?

Response: Any changes in ADA act will increase project costs because they may require additional walkways or access ramps to be constructed, but the project is currently ADA compliant so no changes should be necessary.

4. SANDBARS

Sandbars reduce the strength of the waves and their impact on beach erosion as well as provide recreational enjoyment.

Concerns

4.1 Will expanding the flat beach to 125 feet eliminate the sandbar?

Response: Sand Bars will not be eliminated; some of the troughs in front of the bars on the foreshore slope will be filled initially by the construction template. After a brief period of equilibration, the sand bars will persist on the design profile. The equilibrium profile is simply a translation of the existing profile. Historical monitoring data has shown the seafloor and offshore bars return to pre-project conditions, only translated offshore due to the additional berm gained from the Federal project. Adjustment is expected to occur over the first winter season.

4.2 What impact will the loss of the sandbar have on beach erosion from incoming waves?

Response: There will not be a loss of the sand bars, after a brief period of equilibration, the sand bars will persist on the design profile. The equilibrium profile is simply a translation of the existing profile. Historical monitoring data has shown the seafloor and offshore bars return to pre-project conditions, only translated offshore due to the additional berm gained from the Federal project. Adjustment is expected to occur over the first winter season. Profile adjustment will occur more rapidly when subjected to severe surge and wave energies.

4.3 What is the predicted velocity of the waves at the slope line in absence of the sandbar combined with the new slope?

Response: We are not sure what the author means by the slope line, however, in general any change in the profile would not have a significant effect on the incoming wave velocities. Wave velocity for shallow water waves is equal to the √(g*d) , (the square root of (gravity multiplied by the water depth)), so regardless whether there is a bar or a gentle slope at a certain depth, the velocity of the wave would remain consistent.

4.4 Will eliminating the sandbar increase the dangers of riptides?

Response: As we have noted previously after a brief period of equilibration the sand bars will persist on the design profile. The overall project template will equilibrate to the shape of the existing beach in the near shore, unless there are significant changes in normal wave energies and directions from the historical record. Profile adjustment is expected to occur over the first winter season.

It should be noted, it is widely accepted that the existence of nearshore bars are a principle contributor to the formation of rip currents. Rip currents most typically form at low spots or breaks in sandbars, and also near structures such as groins, jetties and piers. A good source for further information on Rip Currents is at the following web site: http://www.ripcurrents.noaa.gov/overview.shtml.

5. RECREATION
Concerns

5.1 Will the marine life covered with the replenishment sand die?

Response: The Final Feasibility Report and Environmental Impact Statement, (FEIS), describes how impacts to species utilizing the replenishment zone will be minimized through use of seasonal restrictions and further consultation with environmental regulatory agencies prior to initial nourishment. Beach and intertidal areas utilized by threatened and endangered species will be identified and protective zones established. Measures taken to reduce impacts to marine species are also summarized, such as the use of National Marine Fisheries Service approved turtle monitors and drag arm deflectors on hopper dredges, and the timing of dredging to minimize potential adverse impacts to these species. The COE through the non federal sponsor coordinates with NJ Endangered and Nongame Species Program prior to construction to develop and implement a comprehensive beach nesting bird management plan. Further discussion can be found in several sections throughout the FEIS.

The majority of the diverse assemblage of infaunal species will initially be covered. Depending on the depth of sand placed, some more mobile species can migrate to the surface and survive the temporary burial. Many intertidal infaunal species have evolved to withstand their natural dynamic environments and can reduce respiration/feeding during periods of temporary environmental stress. Other infaunal species do not survive the initial placement of a foot or more of sand. The key point to keep in mind is that intertidal infaunal species, such as amphipods and ploychaetes are opportunistic species: are short-lived with large reproductive output, thus enabling them to recolonize areas rather quickly from adjacent areas (larvae are free-floating in the water column). Numerous studies support this occurrence in coastal environments and typically cite several months, depending on local conditions, for infaunal composition to reestablish. A study recently done on NJ beaches (Asbury Park to Manasquan-by Mark Burlas), encompassing a 7 year period, demonstrated that beach nourishment resulted in short-term declines in intertidal and nearshore benthic organisms abundance, biomass, and taxa richness. Recovery of these assemblages was complete within 2 to 6.5 months following the conclusion of beach filling. Differences in the recovery rates were likely attributed to what period in the year beachfill occurred. Recovery rates seen in this 7 year study were similar to those reported from other biological monitoring studies of beachfill jobs. This study looked at Ichthyoplankton (baby fish-no obvious differences between reference and nourished beaches in abundance, size, and species composition), potential fish food items in both ichthyoplankton and rock groin epifaunal, and surf zone finfish (no long-term impacts to their distribution or abundance patterns). There are numerous studies in the literature to support these findings in all kinds of coastal beach environments.

5.2 What impact will covering the jetties have on marine life and recreational fishing?

Response: All coastal ecosystems are dynamic environments, subject to often unpredictable and large environmental changes. Initially, the majority of groins will be covered entirely by sand. The majority of the epifaunal (attaching invertebrates) and infaunal (in the sand invertebrates) inhabiting these rocky habitats will be smothered, as indicated above. Within months, the groin rock will begin to become exposed again, thus providing the same rocky substrate that previously existed. The populations of opportunistic species that typically move in to colonize these habitats will undergo a successional colonization whereby species diversity and composition will change over time. Early colonizers are those that thrive better under minimal competition, whereas the more mature steady-state epibenthic colonizers will eventually establish, thus once again providing the habitat and food source to finfish typically present around rocky substrate. The burial and subsequent reemergence of the groins provides an opportunity for the successional recolonization of epibenthic, infaunal and finfish assemblages**.**

5.3 Will extending the flat beach have a negative impact on surf riding activities?

Response: Initial construction may have an effect on surf riding activities in some areas. Surfing conditions in any affected areas would be expected to improve as the project adjusts to the design shape. While the project may temporarily impact some surfing locations, the influx of sand to the system will create additional opportunities for new sand bars and surfing breaks that did not exist before the Federal project. Over time, the groins will become more exposed and approach pre-project surfing conditions. In both the Ocean City and Absecon Island projects, surfing on those beaches was documented just a few days following placement of the construction template.

5.4 What is the recreational impact to swimmers if the sandbars are eliminated?

Response:. No significant impacts to swimming are expected following initial construction and adjustment of the project. Sand bars are expected to persist on the design profile after a period of initial equilibration. Under most tide and wave conditions swimming will remain the same after construction as before; with the exception that immediately after initial construction the groins will be covered and the steepness of the nearshore sand bars will be reduced. Both of these factors potentially will temporarily reduce the chance of rip tides forming as discussed above. As on any beach, natural or nourished, during times of high surf conditions as the wave heights and periods increase swimming will remain dangerous and the chance of rip tides forming is increased.

6. QUALITY of the RENOURISHMENT SAND

Concerns

6.1 How is "suitable material" determined?'

Response: "Suitable material" is determined by comparing grain size (sieve) analyses of samples from along the existing beach to those of the vibracores taken in the borrow area to ensure size compatibility as defined by analyses in the Corps' Coastal Engineering Manual. The samples showed the sand to be fine to medium grain sand of similar grain size as the existing beach.

6.2 When will the replenishment sand be tested for contaminated material and will it be tested prior to placement on the beach?

Response: Based on the boring logs and sampling results from the borrow area, the sand in the borrow area has less than 1% fine grained material (silts and clays) as can be seen in the core logs shown on the drawings and the sieve curves in the specification. Per NJDEP guidance, "The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters", dated October1997, which states that for beach placement, sand with a 10% or less fine -grained (silt and clay) component does not

require analytical testing as contaminants do not generally adhere to soil particles of sand size (.075mm and larger).

6.3 How often will the replacement sand be tested for contaminated material?

Response: Per NJDEP guidance, "The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters", dated October of 1997 which states that for beach placement, sand with a 10% or less fine -grained (silt and clay) component does not require analytical testing as contaminants do not generally adhere to soil particles of sand size (.075mm and larger).

6.4 Will samples of the sand be made available to the public prior to the initial construction?

Response: We are afforded minimal space at our storage facility and cannot keep the cores after completing logging and sieving. The logs and sieve results are the technical record of what the material is in terms of size, gradation, and color. To our collective knowledge, interest in seeing the actual samples has not come up as a request prior to construction in previous District beachfill projects. The upcoming beachfill in Surf City will afford everyone to see an example of the fill material from the borrow area.