Wetlands/Coastal Dune Board

Work Session
SEA Consulting
325 Mason Avenue
July 20, 2016
5:00 p.m.

At approximately 5 p.m., Chairwoman Ann Hayward Walker, having established a quorum, called to order the Wetlands/Coastal Dune Board Work Session. Board members Russ Dunton, Bob Roche and Joe Fehrer were in attendance. Also present were Manager Brent Manuel, Town Planner Larry DiRe, Public Works Foreman John Lockwood and Assistant Town Clerk Tracy Outten. There was one member of the public in attendance.

Chairwoman Ann Hayward Walker welcomed the Board, Town staff and the member of the public for attending the meeting.

REVIEW OF RESEARCH MATERIALS AND DOCUMENTS:
Discussion was based on attached materials.

TIMETABLE AND NEXT STEPS:
Proposed Beach Maintenance as follows:

- Dune height maximum 6' above boardwalk, 14' above meanlow water
- A minimum of 30' wide
- Cross overs 6' wide with wood planks

The numbers above were based on FEMA's recommendations for dune heights.

Chairwoman Ann Hayward Walker thanked the Board, Town staff and the member of the public for their time and adjourned the Wetlands and Coastal Dune Board Work Session.

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Chairwoman Ann Hayward Walker

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Assistant Town Clerk

Worksheet for July 20, 2016 Meeting

Of the Cape Charles Wetlands and Dune Board

Board Member: __Collective Board Input____

To facilitate our discussion on June 20th, please electronically add into the outline below the items you recommend, and, as appropriate, the source of the recommendation (report title, personal experience, personal observation, etc.)

Please also think about which ones you think are most important, e.g., immediate/top priority. I think we might also need to provide the town some sense of our agreed priorities once we have a list of our collective recommendations.

VIMS report/Hardaway 2004) on Northampton County

Chesapeake Bay coast of the county is very dynamic in terms of shoreline change and sediment transport processes. The county coast is rich in sand along the shoreline and nearshore due to high shoreline recession rates of sandy upland banks. Two primary long-term processes which cause the shoreline to recede: wave action and the slow rise in sea level (began 18,000 yrs. ago). Sea level rise for the area is about 1.45 ft. /century. Highest erosion takes place along open bay shore reaches where fetch exposure (35 nm up the bay to the NW) are the greatest. Long term trend for the county is about -1.0ft/year.

Cape Charles area: natural coastal sediment composition: yellowish-gray fine to medium sand. CC beach is referred to as man-made and has general shore recession although areas south accrete following beach sand deposition at the public beach.

Language from the Comp Plan

a. Protect public beach from degradation (continue with beach nourishment) for present and future generations
b. Preserve the integrity of and accessibility to the water's edge
c. Control dune, beach and shoreline erosion
d. Enhance the beach as an amenity for residents and visitors
e. Establish a plan for funding continual maintenance and sand replenishment of the beach
f. Protect amenity - views of beach (and harbor)
g. Natural erosion of the shoreline must be abated to maintain the safety of the residents' homes, welfare and recreational opportunities
h. Protecting and preserving the coastal dunes

Nordstrom and Jackson 2013: List of 15 ecosystem services and functions from dunes. Human action can be used to build and rebuild dunes but beach nourishment is required to maintain a healthy, well-vegetated dune on an eroding shore.

Chapin p. 40 – "Replenished beaches help manage erosion but don't prevent it"

MA StormSmart Properties (SSP) Fact sheets: No shoreline stabilization option permanently stops all erosion or storm damage.

Personal comment: It seems that it is the town and state's property (boardwalk and road) that the dunes can offer some protection from storm-driven erosion, rather than the adjacent property owners. ***It also seems that a wider***

beach is needed in order to build and maintain lower, wider dunes, implies that perhaps the town should receive all 100,000 cubic yards of sand to build a wider beach and dunes along the entire beach.

1. Different recommendations for the different "zones" in the beach? For example:
    - South end (Harbor/Mason Ave. to Tazewell Ave.) Established dunes that are moving seaward, and continuously growing in height as new sand blows there from the north; also consider the build-up of sand along the harbor and on the Fun Pier
    - Mid Beach (Tazewell Ave. to Jefferson Ave.) Transition zone from high dunes in the south, widening beach, to narrowing, scoured beach with low dunes
    - North end (Washington Ave. to Jefferson Ave.) Scouring that threatens the bulkhead, inadequate sand for the beach, low to no dunes

I think it makes sense to have different zones, at least until the beach seems more uniform which we might be able to tell in a year or so. That is, maybe initially but then after that treat as a system.

I like the idea of creating zones. Each zone, while part of the "beach/dune" system has unique characteristics that should be addressed separately. An excellent example of this is the VIRGINIA BEACH MANAGEMENT PLAN which was included in an e-mail by Ann Hayward Walker on July 10th.

https://www.vbgov.com/government/departments/planning/areaplans/Documents/Oceanfront/beach_management_plan.pdf

2. Sand deposition, retention, and maintenance actions for different locations on the beach and/or times of year? See references 1 and 7

    - Sand fences – angle to wind, with or without fabric behind it, etc.?

In reading various recommendations from other municipalities there seems to be no consensus as to whether to place sand fences perpendicular to the prevailing wind or parallel to the water. All approaches emphasized the need to insure the fence is wide enough.

Nordstrom and Jackson: There is often greater use of sand-trapping fences than is necessary (Grafals-Soto and Nordstrom 2009). Sand fences should not be placed where a dune of adequate size already exists, where they would trap sand in unnatural configurations, or where they cannot be buried, such as in vegetated portions of the dune or too close to the water. In many cases, sand-trapping fences need only be used for creation of the first dune ridge that functions as the core around which the natural dune can evolve (Nordstrom et al. 2000; Grafals-Soto and Nordstrom 2009). The location of the contact between the foredune and backshore is determined by erosion of the foredune during storms and dune accretion following storms. Storm wave uprush may eliminate the seaward portion of the dune and create an erosional scarp, but post-storm beach accretion creates a new source of sand to be blown to the foredune, reestablishing the dune sediment budget.

Straight fences placed parallel to the shore appear to provide the most economical method of building protective dunes (CERC 1984; Miller et al. 2001). Zig-zag fences can create wider dunes with more undulating crest lines and more gently sloping dune faces that are closer to the shapes of natural dunes (Snyder and Pinet 1981). Paired fences can create a broader based foredune with a rounded crest that can look more natural (Schwendiman 1977). Side spurs perpendicular to straight alongshore alignments can increase trapping rates in locations of strong longshore winds. Multiple lifts of fences can create a higher dune with much greater volume than single lifts (CERC 1984; Mendelssohn et al. 1991; Miller et al. 2001). … In these cases of a widened beach, the landward fence could be at least 100 m from the active beach, as suggested by Dahl and Woodard (1977) and Miller et al. (2001).

Personal comment: Is USACE proposed method of sand fence installation "paired fences" or "side spurs"? Also conversation with Norfolk employee and literature review, fences may be necessary for newly created dunes to survive storms 1 year when built landward of the upper-most storm wrack line. Should we revisit fence design?

Dune Book, pages 21-23. Fences have some problems, are considered temporary solutions.

Coastal Dune Protection and Restoration: p. 3 "Once established, American Beach grass traps sand at a rate comparable to multiple sand fences"! Adding spurs to a straight sand fence, building zigzag configurations, or perpendicular or oblique configurations do not measurably improve long-term fence performance, and increase construction costs. Gently sloping, wider seaward facing dunes are less prone than steep slopes to wave induced scraping and loss of sand from storms.

Also review Scotland: "A guide to managing coastal erosion in beach/dune systems"**:** http://www.snh.org.uk/publications/on-line/heritagemanagement/erosion/appendix_1.5.shtml Shows pros and cons of multiple methods. Dune fencing example:

Appropriate locations	Above normal limit of wave run-up at any location with available blown sand. Unlikely to succeed where erosion is severe.
Cost	Low, but requires on-going maintenance. (£400 - £2000/100m frontage length, plus cost of transplanting and on-going repairs)
Effectiveness	Enhancement to natural dune recovery. Limited resistance to storm erosion. Enhanced by vegetation transplanting.
Benefits	Minimal impact on natural system. Can be used to control public access and to improve other systems.
Problems	Damaged fences and accumulated debris can be unsightly. Fences need regular maintenance and have a maximum life of about 5 years depending on material, frequency of storm wave damage and vandalism.

- Using the dunes as sand storage for the beach?

Coastal Dunes: A primer… (Rutgers Univ. 2000) - Dune reservoir: the portion of the dune that is fornt of the dune crest and above the 100-year flood level.

- Mechanical grooming on the beach? This is referred to as "sand raking"

Nordstrom and Jackson: Raking is one of the most common environmentally damaging actions on shores developed for human use… Finding a way to retain wrack is critical to conserving or restoring beach and dune habitats in developed areas. Alternatives for wrack management include:
1. Selectively removing the cultural litter and leaving the natural litter using non-mechanical methods
2. Leaving the highest storm wrack line on the backshore while raking the beach below it
3. Restricting cleaning operations to the summer (tourist season) or after massive fish kills
4. Leaving longshore segments unraked to develop as natural enclaves (Nordstrom et al. 2000).

- Large equipment moving of sand on/for the dunes?

The Dune Book p. 25: This seems to be known as "beach scraping" and is not advised. Alternative to scraping is adding/buying more sand – not really an option for CC.

Carley, J. T., et al. "Beach scraping as a coastal management option." *Proceedings of the 19th NSW Coastal Conference*. Vol. 890. 2010: Beach scraping is defined as the movement of sand from the intertidal zone to the dune or upper beach by mechanical means. It has also been called beach skimming, beach panning, nature assisted beach

enhancement and assisted beach recovery. Beach scraping mimics natural beach recovery processes, but increases the recovery rate compared with natural processes. In combination with revegetation schemes, beach scraping has commonly been used for dune building.

Norfolk McN&A doc: Reservoir volume (dune height and width) do matter and is key to protection

Personal comment: A continuing source of sand is necessary to maintain dunes but it doesn't appear that moving sand each year via heavy equipment is beneficial to the dune that is the source of the sand (no specific reference).

- Vegetation planting and maintenance (see Attachment 2)

Gulf Shores AL: Vegetation is a natural agent to stabilize sand within the coastal dune environment. Salt and sand-resistant species grow upward through the sand and spread laterally thereby forming a dense mat of roots and rhizomes that, in conjunction with their associated mycorrhizal fungi help lessen erosion of dune habitat due to wind and water. The most visible method of increasing plant mass is through rhizome spreading.

The Dune Book pg. 20-21: The density of the planting will directly affect the amount and location of blowing sand trapped by the plants. Using a closer spacing of plants will require more plants but will trap and stabilize more blowing sand. Space the first few rows of plants in a 12-by-12-inch grid and arrange the plants in a staggered pattern from row to row.
• After planting several rows with this spacing, increase the plant spacing and row width to 18 to 24 inches for three or four more rows and stagger the plants from row to row.
• Increase the plant spacing and row width to 36 inches for the last two or three rows closest to the ocean.
• Remember that all plants should be planted well landward of the high-tide line and seasonal beach fluctuations. Because the available blowing sand supply comes from the dry sand beach between the high-tide line and the area to be planted, this graduated spacing pattern allows more sand to blow through the wider spaced rows and accumulate in the tighter spaced plants where the volume of sand provides the most protection.

Nordstrom and Jackson: Tolerance to burial is an important cause of zonation of plant species on coastal foredunes, and burial can have a stimulating, positive effect on the growth of dune-building plants and prevent degeneration (Maun 2004).

USDA NRCS Plant Guide: Major use is to stabilize moving sand along the Atlantic seacoast and Great Lakes region. It is the best species for the initial stabilization of frontal dunes. One outstanding growth characteristic is the strong underground stems (rhizomes) that spread beneath the sand and give rise to many new plants. Its vigorous growth enables the plant to withstand heavy deposits of sand and grow up through it.
Best time to plant American Beach Grass in mid-Atlantic: October 1 to March 30 in the Mid-Atlantic region. Space plants 18" by 18" unless wind erosion is severe, then spacing is reduced to 12" by 12". Fertilizer properly applied is the key to good vigorous growth, as coastal sands are rather infertile. Apply fertilizer 30 days after planting, but no earlier than April 1 in the Mid-Atlantic and May 1 in New England. Inorganic, granular fertilizers high in nitrogen are best, if available (N-P-K analysis of 30-10-0, 16-8-8 or 10-10-10). Split the fertilizer applications: One in spring, another early summer, and a third in late summer, only in the establishment year. Apply no more than 1 lb. of N/1000 sq. ft.in a single application.

City of Norfolk PowerPoint: Beware of /remove invasive plants p. 28

Can't recall source (AL?): Consider multiple/additional types of vegetation?

Coastal Dune Protection and Restoration: p. 3 Begin dune building farthest landward form mean high water as possible; plant vegetation at least *100 ft. or greater landward of mean high water*. p. 9 Rapid dune stabilization or steep slopes Plant 2-3 culms per hole at 12" spacing. Maximum dune width – gradually increase spacing seaward,

also decreasing plant spacing both landward and seaward from dune crest increased dune width and reduced slope of seaward dune from about 10% to 5%. Most dense plant spacing in the most landward location. Dune will grow in the direction of the source of windblown sand (so from the north on CC beach?)

Most, if not all of the beach/dune management plans that I read included all of the above.

- Other actions to prevent sand from blowing off the beach and dunes?

Norfolk PowerPoint: Christmas trees are not recommended. The Dune Book views them as temporary

Gulf Shores AL plan: Don't use hay bales

3. Timing of actions?
    - Immediate Post-Corps sand deposition (Fall 2016 only) what needs to be done to stabilize the sand for this coming winter season?

My recommendation for first priority

USDA Plant Guide: Best time to plant American Beach Grass in mid-Atlantic: October 1 to March 30 in the Mid-Atlantic region.

- Fall - pre-winter sand stabilization each year
- Spring – annual debris removal, sand grooming and preparations for summer season
- Summer – sand maintenance and debris removal each year

Agree, each season has unique maintenance requirements

4. Recommendations for managing sand deposition?

Nordstrom and Jackson: The first step in building new dunes may be to build any dune-like feature, even if low, narrow, linear, and fixed in position, as has occurred in the State of New Jersey (Mauriello and Halsey 1987; Mauriello 1989).

- Dune height recommendations - Is there an "appropriate" height? Can they be topped off?

Norfolk PowerPoint: 14' H (> 30' W and 1:5 slope)

Coastal Dunes: A Primer… (Rutgers University, 2000) – pg. 13-14

- Dune width recommendations? (landward boundary controlled by the boardwalk)

Norfolk PowerPoint: > 30' W and 1:5 slope or greater

Coastal Dunes: A Primer… (Rutgers University, 2000) – pg. 13-14

- Beach width recommendations – how far seaward?

Coastal Dune Protection and Restoration: p. 3 Begin dune building farthest landward form mean high water as possible; plant vegetation at least 100 ft. or greater landward of mean high water.

Coastal Dunes: A Primer… (Rutgers University, 2000) – pg. 13-14

5. Other issues and considerations

Other studies and plans seem to recommend that access passages be above the existing dunes. Some of the existing current beach access [pints are cut through the dunes. One study states that such conditions and cause

"blow outs" of surrounding dunes. This may be a cause of some of the sand that is ending up on homeowner's properties.

- Ongoing monitoring of the beach to have data-driven decisions in the future - see reference 9

Gulf Shores AL pg. 27-28 – monitor for 30 years! Many other references also mentioned the need for/value of monitoring.

- Roles of entities with responsibility – see reference 3
- Sand interaction with the breakwaters to stabilize an appropriate width of beach and to minimize shoreline erosion
- Public interaction with the dunes, e.g., walkways

Dune Book page. 24 for details. Direct pathways that are more than 3 feet lower than the dunes should be avoided. Many other references also mentioned the importance of not walking on the dunes.

NJ Sea Grant Consortium (NJSGC) Dune Manual (Draft) – p. 21-25

- Sand on the sidewalks and Fun Pier – public safety and access impediments

Personal comment: Need to remove sand from sidewalks for safety. Sand build up is clearly evident when walking along several areas on Bay Ave. and western end of Mason Ave. close to Bay. It seems that sidewalk maintenance is not the legal responsibility of adjacent property owners.

- Sand on property of Bay Ave. owners and view from Bay Ave. (FYI - taxes are higher for properties with a view; no water view lowers the appraisal portion of their tax assessment - I called the county last week to learn this)

Personal comment: Reasonable to consider their input for potential solutions which do not compromise the public trust by reviewing the comment sheets from the June 15hr meeting and allowing further public review of the draft board's recommendations.

- Relationship to FEMA rules and funding https://www.fema.gov/floodplain-management-definition

From the above referenced VB Management Plan:

In the opinion of the Commission, the restoration and replenishment of public beaches should be the responsibility of the government and should therefore be financed through federal, state, and local funds. If these funds are not available, then City Council should allow the residents of specific beach areas to elect to create a Special Service District.

In paraphrasing another report, there are many excellent beach/dune management plans available on the internet so there is no need to re-invent the wheel.

Any recommendations we make should be done independent of whether or not the town has the manpower and/or funds to implement them.

FEMA 540 SF Criterion = Primary frontal dunes will not be considered as effective barriers to base flood storm surges and associated wave action where the cross-sectional area of the primary frontal dune, as measured perpendicular to the shoreline and above the 100-year stillwater flood elevation and seaward of the dune crest, is equal to, or less than, 540 square feet. https://www.law.cornell.edu/cfr/text/44/65.11

FEMA Fact Sheet 9580.8: Eligible Sand Replacement on Public Beaches

Eligibility is divided into two areas: emergency work and permanent work (restoration of damaged facilities). This Fact Sheet addresses eligibility requirements for each area.

FEMA Disaster Assistance Fact Sheet DAP580.9: To document eligibility of the beach as a designed and maintained facility, the Town should be able to provide the following information to FEMA:

1. All design studies, plans, construction documents, and as-built for the original nourishment.
2. All studies, plans, construction documents, and as-built for every nourishment.
3. Documentation and details of the Maintenance Plan, including how the need for nourishment is determined and funded.
4. Pre- and Post-storm profiles of that extend at least to the seaward edge of the sub-aqueous nearshore zone (closure depth, usually –15 to –20 feet).