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July 17, 1996

In The Matter Of:

Giles H. Dunn
Gail W. Dunn

Docket No. 89-072
File No. 44-212
Mattapoisett

TENTATIVE FINAL DECISION

Summary

Appeal by Applicants Giles and Gail Dunn from a wetlands Superseding Order of Conditions denying permission pursuant to M.G.L. c.131, §40 to build a single family house with associated septic system and driveway on a coastal dune and barrier beach in Mattapoisett. Following substitution of Administrative Law Judge after hearing, Superseding Order of Conditions denial is confirmed. Project does not meet the performance standards for work in a coastal dune (310 CMR 10.28).

Procedural History

This wetlands appeal arises from a proposal by Giles and Gail Dunn to build a single family house, driveway, and septic system on their property in Mattapoisett. The lot is located on the shoreline and contains a coastal beach, a coastal dune, a barrier beach and a vegetated wetland bordering a pond. The project was originally approved by the Mattapoisett Conservation Commission. The Department of Environmental Protection (the "Department") took jurisdiction over the case and issued a Superseding Order of Conditions denying the project.

The Dunns appealed the denial, and an adjudicatory hearing was held before Administrative Law Judge M. Kathryn Sedor on October 24 and 25, 1994. ALJ Sedor left the employ of the Department in 1995 without having issued a decision in this case, and the matter was transferred to me. I reviewed the testimony in the case and concluded that I could not decide the case without evaluating the credibility of witnesses whose testimony I had not observed. See Town of Southbridge Zoning Board of Appeals v. Housing Appeals Committee, et al. (Worcester, C.A. No. 94-650, August 18, 1995). Where issues of credibility are central to the decision, a case may not be decided by a subsequent factfinder reviewing a transcript or a tape recording of the proceedings. Salem v. MCAD, 404 Mass. 170, 174 (1989); Dowd v. Director, 390 Mass. 767, 771 (1984).

I informed the parties of my conclusions and offered two alternatives. The parties could either agree that I decide the case on the record before me, waiving whatever rights they had to challenge findings based on assessments of witness credibility,[1] or the parties could choose to retry those portions of the case which were presented live.[2] The Dunns and the Department opted for a decision on the record instead of any rehearing. It was nonetheless necessary to rehear the cross-examination of one of the Department's witnesses, Lealdon Langley, as there was no record of

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[1] M.G.L. c.30A, §10 permits parties to agree to vary the procedures prescribed by the State Administrative Procedure Act.

[2] The direct testimony in this case was prefiled, and the hearing consisted solely of cross-examination, redirect and recross.

his cross-examination. That rehearing was accomplished on February 29, 1996. The parties requested that I visit the site, and I did so in the company of the Dunns and Mr. Langley on March 27, 1996. The record was closed on that date.

This decision is issued as a tentative decision in accordance with 310 CMR 1.01(10)(n)(1986 rev.)[3]

Issues for Adjudication

The prehearing conference report identified four issues for decision in this case. They are as follows:

1. Whether the project meets the performance standards under the Wetlands Protection Act, M.G.L. c.131, §40, and its regulations, 310 CMR 10.00, for construction in coastal dunes, coastal beaches and barrier beaches.

2. Whether, and in what manner, Executive Order 181 applies to the permitting of the project.[4]

3. Whether the project would be located in a Velocity Zone.

4. Whether, and to what extent, the project would be located in an area subject to erosion.

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[3] The Department's Rules for Adjudicatory Proceedings were revised and repromulgated on July 3, 1995. Because this case was filed and scheduled for prehearing conference prior to the effective date of the new regulations, it is conducted in accordance with the 1986 rules. See, 310 CMR 1.01(15)(1995 rev.).

[4] Executive Order 181 concerns the permitting of projects proposed to be built on barrier beaches located in Federal Emergency Management Agency (FEMA) -designated Velocity Zones.

Discussion

I.

A. Framework of the Wetlands Protection Act and Regulations

The Wetlands Protection Act and the Wetlands Regulations identify certain areas which are subject to protection. These areas include coastal beaches, barrier beaches and dunes. M.G.L. c.131, §40, first; 310 CMR 10.02. Each area identified by the Act and Regulations is presumed to be significant to the protection of certain interests. Coastal beaches are presumed to be significant to the interests of storm damage prevention, flood control and wildlife habitat; barrier beaches to the interests of storm damage prevention, flood control, the protection of marine fisheries, wildlife habitat, and, where shellfish are present, the protection of land containing shellfish; and coastal dunes to the interests of storm damage prevention, flood control, and the protection of wildlife habitat. 310 CMR 10.27, 10.29, 10.28. Projects proposed to be built in these areas must meet performance standards specified in the Regulations. Projects which meet those standards are considered to contribute to the protection of the interests identified in the Act and Regulations and thus may be permitted.

The Act and the Regulations list a total of eight interests to which wetlands resource areas may be significant.[5] M.G.L. c.131, §40, thirteenth; 310 CMR 10.01(2). The resource areas are presumed

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[5] The eight interests are: protection of public and private water supply, protection of ground water supply, flood control, storm damage prevention, prevention of pollution, protection of land containing shellfish, protection of fisheries, and protection of wildlife habitat.

by the Regulations to be significant to one or more of these interests depending on their wetland functions.

Any person filing a Notice of Intent to work in a wetlands area has the burden of demonstrating to the Department either that the area is not significant to any of the eight interests or that the proposed work will comply with the general performance standards established for that area and thus contribute to the protection of the interests identified in the Act and Regulations. 310 CMR 10.03(1). When a resource area is presumed significant to an interest, the applicant can overcome that presumption only upon making "a clear showing" that the resource area plays no role in the interest specified. See 310 CMR 10.27(1), 10.28(1), 10.29(1).

B. Presumptions of Significance: Barrier Beach and Coastal Dune

The Dunns took the position that the barrier beach and the coastal dune on this property are not, in fact, significant to the interests to which the Regulations presume them to be. The burden was thus on the Dunns to make a "clear showing" that the barrier beach and the dune play no role in the interests of storm damage prevention, flood control, protection of marine fisheries, wildlife habitat, and protection of land containing shellfish,[6] and the interests of storm damage prevention, flood control, and protection of wildlife habitat, respectively. 310 CMR 10.29, 10.28; See

[6] The Department determined in the Superseding Order of Conditions that the area was significant to the interest of protection of land containing shellfish. The regulations presume barrier beaches to be significant to this interest where shellfish are present. See 310 CMR 10.29. The Dunns have not challenged the Department's finding that shellfish are present at the site.

discussion, above at 4-5.

In support of this position, the Dunns presented the testimony of Jerome Carr. Dr. Carr is a consultant with many years of experience in the field of environmental science. He earned a Ph.D. in geology and holds a Masters degree in geophysics.[7] Dr. Carr visited the site and was familiar with the project plans and the permitting history of this case.

i. coastal dune

Dr. Carr testified that the coastal dune on the Dunns' property is not significant to the interests of storm damage prevention and flood control (Carr redirect). He stated that the beach on the property is growing and produced as an exhibit Shoreline Change Map #0011 issued by the Massachusetts Coastal Zone Management Office (Carr Prefiled Direct Testimony, Exh. 1; Hearing Exh. II). The map details the project area and shows that the shoreline at the site moved seaward between 1895 and 1978. Dr. Carr further stated that because the beach is accreting, the sand at the dune face is also accumulating and thus the face of the dune is either stationary or growing (Carr Prefiled Direct Testimony). Dr. Carr did not connect these facts with his ultimate conclusion. The Regulations state that dunes must be able to erode in response to coastal beach conditions in order to protect the interests of storm damage prevention and flood control. See 310 CMR 10.28.

Dr. Carr further testified that the sand on the dune is coarse

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[7] The Department made no objection to the presentation of Dr. Carr as an expert witness.

based on the results of a sieve analysis he conducted. The analysis shows that the sand on the site is primarily gravelly coarse sand (Carr Prefiled Direct Testimony, Exh. 2). Dr. Carr testified that the coarseness of the sand prevented erosion at the site and caused the beach to be more stable than the "average sand" (Carr Prefiled Direct Testimony). Dr. Carr did not say precisely where on the site he collected his sample, and there is no evidence that the sample was taken on the dune as opposed to the beach. Dr. Carr also provided photographs of boulders on the site (Draft Environmental Impact Statement, Figures 2A, 2B, 2C), arguing that if the site were unstable it would have been "washed out" many times thus lowering the elevation of any boulders. He argued that, were this true, no boulders should be visible on the surface. According to Dr. Carr, the photographs of boulders visible at the surface are proof of dune stability (Carr Prefiled Rebuttal Testimony). Dr. Carr also stated, without providing any supporting documentation, that the dune is not likely to migrate laterally because the site consists of a short stretch of protected beach (Carr Prefiled Direct Testimony). Again, Dr. Carr did not connect this testimony with his ultimate conclusion. Taken in a light most favorable to Dr. Carr, these facts might establish that the coarseness of the sand and the length of the beach would make the site so stable that the dune would not erode, move, or be changed by wind or water. By comparison, the Regulations state that the dune's ability to erode, to be changed by wind or water, and to move landward or laterally are critical characteristics which protect the interests of storm damage

prevention or flood control. See 310 CMR 10.28.

Dr. Carr testified to the presence of a stream on the site which connects the pond behind the dune to the ocean in front of the dune. According to Dr. Carr, the presence of the stream increases the stability of the site by providing an outlet for water which has overwashed the dune during storm events. The stream provides a channel for the water to flow back into the ocean, thus making erosion resulting from backflow through the site unlikely (Carr Prefiled Direct Testimony). As before, Dr. Carr made no attempt to connect this observation with his ultimate conclusion that the dune does not play a role in storm damage prevention and flood control. At best, these facts might prove that the presence of the stream so stabilizes the site that the movement of the dune is diminished to the point where it is insignificant.

Finally, Dr. Carr stated that the dune neither controls flooding because in large storm events the dune is flooded nor prevents storm damage because no waves of significant height pass over the dune. He added that there is nothing to be protected around the pond in any event, an apparent reference to the fact that there are no buildings around the pond (Carr Prefiled Direct Testimony, Prefiled Rebuttal Testimony).

With regard to the interest of protection of wildlife habitat, Dr. Carr testified that he observed no signs of bird nests at the site (Carr Prefiled Direct Testimony).

Applicant Giles Dunn also testified on behalf of himself and Gail Dunn. He stated that he has long been familiar with the

property and believes that the beach and pond have not "appreciably moved" in 50 years. Mr. Dunn submitted with his testimony an 1875 map entitled "Town of Mattapoisett, Mass." to support his contention that the beach and pond have not changed to any great extent in over 100 years (Dunn Prefiled Direct Testimony).

The Department, in rebuttal of the Dunns' assertion that the dune plays no role in storm damage prevention or flood control, presented the testimony of Lealdon Langley and James O'Connell. Mr. Langley is employed by the Department as an Environmental Analyst. Mr. Langley has worked for the Department for ten years, eight of them with the wetlands division. He holds a BA in biology and botany and a Masters degree from Boston University's Center for Energy and Environmental Studies. Mr. O'Connell is a Senior Coastal Geologist with the Massachusetts Coastal Zone Management Office. He has been employed by that agency since 1985. Mr. O'Connell holds a BS in geology (with a minor in coastal studies) and a Masters degree in physical coastal geography/geomorphology.[8]

Mr. Langley testified that although the Shoreline Change Map shows that the beach accreted between 1895 and 1978, the same map shows that the shoreline proximate to the project site suffered a retreat between 1845 and 1895. In some places, this retreat was more extensive than the later accretion (Langley Prefiled Direct Testimony; Hearing Exh. II). Mr. O'Connell estimated the amount of retreat at between 27 and 40 feet, depending upon where along the

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[8] The Dunns made no objection to the presentation of Mr. Langley and Mr. O'Connell as expert witnesses.

coast the measurement is made (O'Connell Prefiled Direct Testimony). The accretion at the project site between 1895 and 1978 was approximately 33 feet (Stipulation, ¶15). Although the "1845" line stops just short of the project site, Mr. O'Connell analyzed the plotted shorelines on the Shoreline Change Map and concluded, based on that analysis, his knowledge of coastal processes and his familiarity with the site, that the shoreline at the project site also eroded between 1845 and 1895 in the same way as the rest of the shore on the barrier beach (O'Connell Prefiled Direct Testimony). Mr. O'Connell stated that most shorelines behave in a cyclic fashion over time and that trend reversals, while impossible to precisely predict, are common. Mr. O'Connell concluded that he believes that a trend reversal for this beach is likely in the near future. He based his opinion on the fact that the sources of sediment for this beach (the coastal banks of neighboring Point Connett and Pease Point) have been armored and are thus no longer supplying sediment to the same degree as before (O'Connell Prefiled Direct Testimony).

Mr. O'Connell agreed with Dr. Carr that the grain size of the sediment at the site would be classified as relatively coarse. Mr. O'Connell reviewed Dr. Carr's data and confirmed it through a visual analysis of a sample he collected at the site. However, his conclusion that the sediment is relatively coarse did not lead Mr. O'Connell to conclude that the site was so stable that the dune would not move. To the contrary, he concluded that most of the sediment transport on this site would be accomplished by wave action or by relatively high wind speeds, i.e., conditions found during

moderate and major coastal storms. Only minor amounts of the sediment would be wind-blown by prevailing winds (O'Connell Prefiled Direct Testimony). Mr. Langley noted that a water velocity of 0.56 feet per second is necessary to move coarse sand (Langley Prefiled Direct Testimony, Exh. 19). A non-breaking wave of one foot in height has a water velocity of 2.5 feet per second (Langley Prefiled Direct Testimony, Exhibit 19). Mr. Langley stated that even a one foot non-breaking wave possesses a water velocity several times that necessary to move the sediment on this site. He testified that he observed evidence of sediment transport during his site visits and supplied pictures he took at the site following a coastal storm. These pictures show wrack lines and overwash fans. They also show beach grass which appears to have been "combed", evidence, according to Mr. Langley, of wave action at the site. A large area of the beach grass is brown and dead, again evidence of wave action with enough force to tear the beach grass from its roots (Langley Prefiled Direct Testimony, Exhibit 17). Mr. O'Connell pointed to the dune profiles provided by the Dunns' engineering firm as evidence of sediment transport and overall dune instability. The profiles show a net loss of dune sediment from 1988 to 1993. They also depict a landward movement of the entire dune during this time (O'Connell Prefiled Direct Testimony; Final Environmental Impact Report, Site Plan dated 12/23/92, revised 1/25/94).

Mr. O'Connell agreed with Dr. Carr that the stream connecting the pond and the ocean would be the preferred route for water to recede to the ocean after a coastal storm. However, Mr. O'Connell

testified that the small stream would not be sufficient to control erosion at the site. He pointed out that storm waters would slowly fill the pond through the stream but that, because the stream is shallow and narrow, the pond would not fill as quickly as the storm waters would rise. Consequently, storm waters and waves would continue to strike the seaward face of the dune, eroding it in the process (O'Connell Prefiled Direct Testimony).

Both Mr. O'Connell and Mr. Langley agreed with Dr. Carr that the dune on the site will become flooded during storm events. However, Mr. Langley maintained that this does not mean that the dune is not significant to the interests of flood control and storm damage prevention. Mr. Langley asserted that in large storm events, the elevation of the barrier beach/dune causes waves to break earlier, diminishing the energy that would otherwise be visited upon more landward points. The barrier beach also limits the amount of still-water flooding and wave action landward of the dune and, in smaller storms, acts as a barrier to completely prevent water and waves from reaching more landward areas. Mr. Langley concluded, contrary to Dr. Carr's assertion, that the barrier beach and dune function in these ways to prevent storm damage and control flooding (Langley Prefiled Rebuttal Testimony).

The witnesses for the Department offered no testimony on the wildlife habitat present at the site. Counsel for the Department, during the redirect examination of Dr. Carr, stated that bird nesting habitat at the project site was not at issue in this proceeding.

Based on the foregoing testimony, I conclude that the Petitioners did not meet their burden of making a clear showing that the dune plays no role in storm damage prevention and flood control. The Department's testimony, on the other hand, is persuasive that the dune does, in fact, protect those interests. I find that water movement on the site is sufficient to move sand of the type present on the Dunns' property; that overwash fans, wrack lines and beach grass document the movement of sediment on the site; that the dune profile deflated and that the dune moved landward from 1988 to 1993; that the height of the dune limits the extent of flooding and, even if completely covered in water, that the dune diminishes wave energy on its landward side by causing the waves to break at a more seaward point.

Mr. Dunn's memories of the location of a beach in relation to the ocean and pond are simply less reliable than physical evidence of actual dune migration. The map introduced by Mr. Dunn is of such a large area that it sheds no light on the matter at hand.

I do not credit Dr. Carr's contention that the coarseness of the sand is evidence of the dune's lack of significance to the interests of storm damage prevention or flood control, and I am unpersuaded that photographs showing boulders in the intertidal area, the heavily vegetated back-dune, or the pond are evidence in support of any particular conclusion. I further cannot conclude that the history of accretion on the beach from 1895 to 1978 is a predictor of future accretion, particularly given the opposite trend from 1845 to 1895. I find that the presence of the stream on the

site does help to channel water flowing to and from the pond during storm events. However, there is no evidence that the stream is able to handle all of the extra water present during storm events so that no erosion occurs elsewhere on the site, or that the stream somehow makes the dune insignificant to the interests of storm damage prevention and flood control. Although Dr. Carr testified that no waves of "significant" height reach the site, he did not define what he meant by significant. Photographs of the site provide evidence that the site is subject to wave action, and the Dunns do not seriously dispute this fact. I accordingly find that the site is subject to wave action. I reject Dr. Carr's contention that the dune does not play a role in flood control and storm damage prevention simply because there is no development behind the dune. The Regulations make no distinction between protection of manmade structures and protection of natural terrain. I find, therefore, based on all the evidence, that the coastal dune at the project site is significant to the interests of storm damage prevention and flood control.

On the issue of protection of wildlife habitat, the Department introduced no evidence, and the Dunns presented Dr. Carr's uncontroverted testimony that the dune provides no habitat for nesting birds. I find, therefore, that the dune is not significant to the interest of wildlife habitat.

ii. barrier beach

The coastal dune is located on the barrier beach. Thus, much of the testimony given about the dune applies also to the barrier

beach. Dr. Carr's testimony regarding the coarseness of the sand, the accretion of the beach based on his analysis of the Shoreline Change Map, and the function of the stream located on the property; Mr. Dunn's testimony regarding the lack of movement of the beach; and the responses of the Department's witnesses apply equally here. My conclusions regarding that testimony remain the same. The Dunns' proffered testimony does not establish that the barrier beach plays no role in storm damage prevention and flood control. The Department's testimony is convincing that the barrier beach performs this role by buffering the landward areas (the pond and the land behind) from elevated water levels and storm waves.

Dr. Carr's testimony regarding barrier beaches in particular supplements his testimony about coastal dunes in only one respect. Dr. Carr insisted that although the function of some barrier beaches is to "wash out or move landward", not all barrier beaches act in this manner (Carr Prefiled Direct Testimony). However, the Regulations state that Massachusetts barrier beaches migrate landward because sediment is continually pushed landward by tides, wind and storm wave overwash. This process maintains the overall sediment volume of the beach and thus allows the barrier beach to continue to serve the functions of storm damage prevention and flood control. 310 CMR 10.29(1). Dr. Carr testified that some barrier beaches get larger over time, enhancing the protection they give to the mainland. According to Dr. Carr, the Petitioner's beach is an example of this. However, Dr. Carr's support for his belief that the Petitioner's beach is growing is the same as put forth in

support of the proposition that the coastal dune was stable. As noted above, I have rejected these arguments. Dr. Carr opines that "it is quite possible that this specific barrier beach will remain in its present location and condition for several more centuries" (Carr Prefiled Direct Testimony). It is possible, of course, but the weight of the evidence leads me to the opposite conclusion: that this barrier beach is migrating and behaving in a manner consistent with the Regulations' description of barrier beach dynamics.

No evidence was introduced regarding the role that this beach plays in the protection of marine fisheries or the protection of land containing shellfish. The only evidence regarding wildlife habitat was the same as that regarding coastal dunes: lack of bird nesting sites.

I find, for the reasons stated in this section and in the section regarding the coastal dune, that the barrier beach does play a role in storm damage prevention and flood control, but is not significant to the protection of wildlife habitat. I further find, based on the lack of any evidence to rebut the regulatory presumption, that the barrier beach is significant to the protection of marine fisheries and land containing shellfish.

II.

A. The Project's Impact on the Barrier Beach/Coastal Dune

Because I have found that the barrier beach and the coastal dune on the project site are significant to the relevant wetlands interests, the next inquiry focuses on whether the project meets the

performance standards for these resource areas. Projects in coastal dunes must not have an adverse effect on the dune by:

> (a) affecting the ability of waves to remove sand from the dune;
>
> (b) disturbing the vegetative cover so as to destabilize the dune;
>
> (c) causing any modification of the dune form that would increase the potential for storm or flood damage;
>
> (d) interfering with the landward or lateral movement of the dune;
>
> (e) causing removal of sand from the dune artificially; or
>
> (f) interfering with mapped or otherwise identified bird nesting habitat.

310 CMR 10.28(3). The regulations for barrier beaches require that projects located on barrier beaches meet the performance standards for coastal beaches and dunes, but add no additional performance standards particularly applicable to barrier beaches. 310 CMR 10.29(3).

The Dunns propose to build a single family house on the coastal dune. The house would be elevated on pilings. The septic system (tank and all components) would also be located in the dune. The system would be a "mounded" system, that is, an additional foot of cover material would be placed or mounded over the top of the septic system in order to meet the regulatory requirements for the installation of septic systems.[9] A driveway and a parking area are also proposed to be built on the back side of the coastal dune. The Dunns contend that their project meets the performance standards

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[9] See M.G.L. c.21, §§6-53; 310 CMR 15.00.

for coastal dunes.[10] The Department argues to the contrary. The Dunns' sole witness on the project's compliance with the performance standards was Dr. Carr. The Department relied on the testimony of Mr. Langley and Mr. O'Connell.

i. Affecting the Ability of Waves to Remove Sand from the Dune

Dr. Carr testified that the project would not affect the ability of waves to remove sand from the dune because this beach is accreting, not eroding. He based this opinion, again, on the Shoreline Change Map (Hearing Exh. II). He further opined that the beach, positioned as it is between Pease Point and Point Connett, does not supply sediment to other beaches, and that, consequently, the movement of sand is not alongshore, but only from the ocean to the pond and visa versa. According to Dr. Carr, sand motion in those directions would not be affected by the pilings or the septic tank (Carr Prefiled Direct Testimony). He gave no basis for this conclusion.

Mr. Langley testified that the driveway and parking area proposed by the Dunns would permanently stabilize and harden approximately 2,300 square feet of the dune (Langley Prefiled Direct Testimony). The Dunns did not dispute this calculation. Neither Mr. Langley nor Mr. O'Connell testified about the effect of the pilings or the septic system on the ability of the waves to remove sand from the dune.

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[10] As the Department and the Petitioner have stipulated that no portion of the project is proposed to be located on the coastal beach, the performance standards for coastal beaches are inapplicable to this project. See below at 32.

I have previously rejected Dr. Carr's contention that the Shoreline Change Map is a predictor of future accretion at this beach and I have also found that the site is subject to wave action (above at 13-14). I now find that waves remove sand from the dune at this site.

There is no dispute that the driveway and parking area will harden the surface of the dune. I find that the hardening of this 2,300 square foot area will impede the ability of waves to remove sand from this part of the coastal dune. I conclude, therefore, that the project does not meet the performance standards of 310 CMR 10.28(3)(a).

ii. Disturbing the Vegetative Cover so as to Destabilize the Dune

Dr. Carr testified that the vegetative cover of the dune would not be disturbed so as to destabilize the dune. According to Dr. Carr, placement of the septic tank, the septic field and the water line would not destabilize the dune because the installation of these structures could be accomplished within one or two days and the dune grass could be quickly replanted. The pilings would permanently remove some vegetation but Dr. Carr stated that this would not destabilize the dune. He acknowledged that the pilings might cause scour and therefore increased erosion as a result of wind action, but he contended that any such scour could be mitigated by planting vegetation or by placing small concrete pads around the pilings at ground level (Carr Prefiled Direct Testimony).

The addition of a driveway and a parking area to the site, although it would permanently remove vegetative cover, would not

destabilize the dune, in Dr. Carr's view. Dr. Carr explained that because the material used for the driveway and parking area would be heavier than the existing sand, the new driveway area would be less subject to erosion than the vegetated dune, and thus would not destabilize the dune (Carr Prefiled Direct Testimony).

Mr. Langley testified that about 4,500 square feet of vegetation would be destroyed on the site. The driveway and parking area would remove approximately 2,300 square feet of vegetation, the house would destroy approximately 2,200 square feet (Langley redirect). The driveway and parking area is proposed to be located on the back dune which is thickly vegetated with brush and trees (Langley redirect; View). The house would be built half in the area now vegetated primarily with beach grass, and half in the area of mature brush and trees (Langley redirect; View).

According to Mr. Langley, vegetation is very important in stabilizing dunes. Mr. Langley explained that barrier beaches and the dunes located on them are mobile, but not overly so. Vegetation on a dune allows the dune to move in response to wind and water, but prevents excessive erosion. In other words, dune vegetation allows the beach and dune to remain relatively stable. If the vegetation is removed, the movement of the sand will be exacerbated. The beach and dune will become too mobile and the dune profile will flatten (Langley, response to ALJ question).

Mr. Langley testified that vegetation is the most effective method of controlling erosion and stabilizing a dune. The roots of the plants grab the sand, the organic debris limits the amount of

sediment movement on the ground surface, and the leaves and branches trap wind-blown and wave-driven sand (Langley Prefiled Supplemental Direct Testimony, Exh. E, F). Mr. Langley's testimony is supported by his photographs of the site which show wrack trapped in the vegetation (Langley Prefiled Direct Testimony, Exh.17). At the site visit, I also observed wrack caught in the vegetation.

Mr. Langley calculated that 75 percent of the vegetation destroyed by the project would be mature forest on the back side of the dune. He stated that this vegetative cover contributes more to the dune's stability than does the smaller vegetation located on the foredune. According to Mr. Langley, removing this vegetation from the project site in order to build the driveway, parking area and house will diminish the ability of the dune to trap and hold sediment, will increase the mobility of the sediment, and will destabilize the dune. Further, the increased mobility of the dune would threaten the bordering vegetated wetland behind the dune by increasing the amount of sediment deposited in that wetland. Mr. Langley testified that he believes that the increase in sediment could exceed the wetland's ability to assimilate it (Langley Prefiled Supplemental Direct Testimony).

In Mr. Langley's opinion, the harm caused by the removal of the vegetation would not be mitigated by hardening the driveway/parking area or by planting beach grass under the house. The hardening of a portion of the dune would "lock up" the reservoir of sediment beneath the driveway/parking area and prevent it from moving. As a result, part of the dune and barrier beach will be unable to move in

response to wave action and wind, and energy will not be effectively dissipated (Langley Prefiled Supplemental Direct Testimony; Langley response to ALJ question). Mr. Langley noted that planting beach grass under the house would not replace the vegetation originally found under the house with that of a similar type, and would not replace the vegetation lost to the driveway/parking area at all. He argued that beach grass would not be as effective as mature forest in preventing erosion because it is less tall, is more porous, and is less densely spaced. Finally, Mr. Langley testified that the proposed beach grass is not likely to survive in the shadow of the house and that, even if the Dunns proposed replanting mature shrubs elsewhere on the site, those shrubs would be unlikely to survive as the only area available for such planting would be the foredune area. Brush and trees would not survive seaward of the dune crest (Langley Prefiled Supplemental Direct Testimony; Langley redirect).

I find, based on Dr. Carr's uncontroverted testimony, that the installation of the septic system and the water line would not destabilize the dune by disturbing the vegetative cover because the area could be replanted and restabilized. I further find, based on Mr. Langley's uncontroverted testimony, that the Dunns' proposal to site the driveway/parking area and the house would remove 4,500 square feet of vegetation, 2,300 square feet of it permanently, and that 75 percent of the mature forest community on the site would be lost to the house and driveway/parking area. I find that the mature vegetation on the site currently acts to trap and hold wind- and water-borne sediment, and that the driveway will not perform this

function. I reject the notion that hardening the driveway/parking area will compensate for the loss of the mature vegetation. Hardening the back part of the dune will simply provide a hard surface for sediment to flow across on its way to the bordering vegetated wetland. Dr. Carr acknowledges as much in his prefiled rebuttal testimony. I further find that the beach grass proposed to be planted under the house will not replace the function performed by the mature vegetation which approximately half of the house will destroy. It is clear to me, based on the evidence presented and my observations at the view, that the only area for replanting mature vegetation would be in the foredune area, and I find, based on the testimony, that the seaward face of the dune cannot support a mature forest community. I find, therefore, that removal of that vegetation would result in increased erosion and destabilization of the dune and I conclude that the project as proposed does not meet the performance standards of 310 CMR 10.28(3)(b).

iii. Causing Any Modification of the Dune Form that would Increase the Potential for Storm or Flood Damage

Dr. Carr testified that the project would not modify the form of the dune in a manner which would increase the potential for storm or flood damage. He suggested that the added fill (the additional one foot of cover) for the septic system and any cut or fill for the driveway would actually assist the dune in its storm damage prevention function by improving the dune's resistance to wave energy dissipation (Carr Prefiled Direct Testimony). Regarding flood damage, Dr. Carr observed that the Department has "always

ruled" that added fill in an area subject to coastal flooding has an insignificant effect on that flooding. He concluded that concerns for coastal flooding as a result of the added fill were without merit. He also stated that whatever cut in the dune was made for the driveway would have no significant impact on wave damage because the removed sand would be relocated to another area on the site. Dr. Carr concluded his testimony on this performance standard with his observation that there is nothing at risk from storm damage or flooding at this site because there are no structures around the pond (Carr Prefiled Direct Testimony).

Mr. Langley and Mr. O'Connell disagreed with Dr. Carr and testified that the project would indeed modify the form of the dune. The Department's witnesses focused primarily on the impact of the septic system on the dune. Mr. Langley stated that the 1,000 gallon septic tank proposed by the Dunns is approximately 4 feet x 6 feet x 6 feet in size. This tank would be buried in the dune.[11] It is Mr. Langley's and Mr. O'Connell's opinion that wave action on this site will erode the cover material over the septic system, and that the waves will then strike the septic system causing scouring in front of and flanking around the tank. As a result, the dune form will be modified.

Much of the testimony about wave action at this site concerned whether the septic system would be located in a FEMA-designated

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[11] Because the septic system would be located within the coastal dune, it is not entitled to the regulatory presumption found at 310 CMR 10.03(3) regarding septic systems constructed in compliance with Title 5 and 310 CMR 15.00.

Velocity Zone. For the purposes of determining whether this project meets the performance standards of the Wetlands Protection Regulations for coastal dunes, the answer to this question is not relevant. What is relevant is the size of the wave that may be expected to reach the dune where the septic system will be sited, and what effect that wave will have.

All parties agree that the seaward portion of the Dunns' property lies within a Velocity Zone as designated by FEMA. As mapped by FEMA, the Velocity Zone extends up onto the barrier beach approximately 80 feet from the mean high water line (O'Connell Prefiled Direct Testimony). The width of the entire barrier beach, from the mean high water line to the edge of the bordering vegetated wetland, is about 210 feet (O'Connell Prefiled Direct Testimony). The house, driveway, and septic system would not be located within what is currently mapped as a Velocity Zone (Stipulation ¶14).

Areas designated by FEMA as Velocity Zones are subject to waves which reach a minimum of 3 feet in height. The 3 foot wave is considered to be the size wave necessary to cause major damage to structures (Langley Prefiled Direct Testimony). Dr. Carr does not dispute the accuracy of FEMA's designation of the seaward portion of the Dunns' property as a Velocity Zone (Carr cross). It is therefore undisputed that 3 foot waves reach 80 feet landward of the high water line on the Dunns' property.

The Department sought to establish, through the testimony of Mr. Langley and Mr. O'Connell, that 3 foot waves would actually extend further up the dune and onto that portion of the Dunns' lot

where the septic system would be located. Mr. Langley presented site-specific calculations showing that a wave height of greater than 3 feet can be maintained at the highest point on the lot (i.e., the top of the dune). He also calculated the amount of dune volume available to withstand a 100-year storm and determined that in such a storm the dune would be completely eroded. Finally, Mr. Langley introduced photographs of the site taken following Hurricane Bob in August, 1991 (Langley Prefiled Direct Testimony). Hurricane Bob was classified as a 15-year storm (Stipulation, ¶18). The photographs show dune grass torn from its roots, beach grass pointing in one direction as if "combed" by the waves, and storm wrack and debris caught at least three feet above the ground elevation in the bordering vegetated wetland. (Langley Prefiled Direct Testimony, Exhibit 17) Mr. O'Connell performed similar calculations using a more conservative (i.e., higher) dune height.[12] He reached the same conclusions as Mr. Langley: that a wave height of greater than 3 feet is possible at this entire site. He also concurred with Mr. Langley's calculations regarding the complete lack of dune reservoir available to withstand a 100-year storm (O'Connell Prefiled Direct Testimony). Mr. O'Connell provided testimony and photographs regarding damage to structures on Cove Street following Hurricane Bob. Cove Street is located along a nearby beach and is similar to the Dunns' property in its orientation to the ocean. The

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[12] The dune height used by Mr. O'Connell is the maximum height reported on the dune profiles prepared by the Dunns' engineering firm. See Final Environmental Impact Report, Site Plan dated 12/23/92, revised 1/25/94.

photographs depict structural damage to some dwellings and show exposed septic system covers (O'Connell Prefiled Direct Testimony, Exh. 8). Both Mr. Langley and Mr. O'Connell concluded that wave heights of 3 feet would reach the area where the proposed septic system would be located (Langley Prefiled Direct Testimony, O'Connell Prefiled Direct Testimony).

Dr. Carr attempted to rebut the testimony of Mr. Langley and Mr. O'Connell by arguing that the theory of joint probability would prevent 3 foot waves from occurring at the site. According to Dr. Carr, it is not possible to have a wave of velocity zone proportions at this site because winds from the southeast will not blow at this site at or near the time of maximum flooding (Carr Prefiled Rebuttal Testimony). Dr. Carr also tried to overcome the force of the Department's evidence by introducing testimonials from residents and old photographs of the property taken sometime after the 1938 hurricane (Carr Prefiled Rebuttal Testimony).

I find the Department's testimony persuasive, and accordingly I find that 3 foot waves will reach the Dunn property beyond the current Velocity Zone designation to the area where the Dunns propose to locate the house, driveway and septic system. Dr. Carr's arguments about joint probability are at odds with his concession as to the accuracy of the Velocity Zone as presently mapped by FEMA. Were I to accept Dr. Carr's joint probability theory, I would be compelled to conclude that 3 foot waves cannot reach the site at all, a conclusion clearly contrary to the fact that a FEMA-designated Velocity Zone is now mapped at the Dunn site (see above

at 25). The old photographs introduced by Dr. Carr are taken from the air, a considerable distance away from the property. Despite Dr. Carr's assertions; I cannot find that the photographs reveal anything about the height of the dune following the 1938 hurricane. The parties have stipulated that the 1938 hurricane was a 100 year storm (Stipulation, ¶17). The photographs were taken at some indeterminate time prior to the end of 1941 (Carr Prefiled Rebuttal Testimony). Dr. Carr has testified that he took no measurements of the dune prior to 1938 or after the 1938 hurricane, nor did he examine any historical land surveys which showed the elevation of the dune in 1938 (Carr cross). Under these circumstances, I decline to draw any conclusion about the behavior of the dune today from its behavior in 1938. There is no data from which I can conclude that the dune height then is similar to what it is today, and there is no reliable data for me to conclude anything of substance regarding the effect of the 1938 hurricane on the dune. Regarding the testimonials, none of these individuals were available for cross-examination at the hearing. Although ALJ Sedor ruled, over the objection of the Department, that she would admit the testimony, the Department's Rules for Adjudicatory Proceedings did not give her this discretion.[13] Accordingly, their testimony is excluded from

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[13] The rules provide as follows:

> All witnesses whose testimony is filed pursuant to this rule shall appear at the hearing on the merits and be available for cross-examination. If a witness is not available for cross-examination at the hearing on the merits, the written testimony of said witness shall be excluded unless the Parties agree otherwise.

310 CMR 1.01(8)(f)(1986 rev.)

the record pursuant to 310 CMR 1.01(8)(f), and cannot be relied upon as the basis for any finding.[14]

Having found that 3 foot waves will reach the area where the project will be located, I further find, based on the testimony of Mr. Langley and Mr. O'Connell, that the septic tank and other system components will become exposed during storm events and will be struck by storm waves. Both Mr. Langley and Mr. O'Connell testified that waves striking the septic tank will cause scour (erosion in front of the tank) and flanking (erosion around the ends) (Langley Prefiled Direct Testimony, Prefiled Rebuttal Testimony; O'Connell Prefiled Direct Testimony). Dr. Carr argued that these effects were inconsequential, and compared the effect of the septic tank on the dune with that of a boulder on the beach (Carr Prefiled Rebuttal Testimony). However, Mr. Langley testified that the septic system is roughly the size of a car, and that his calculations show that erosion of greater than 10% (one foot) of the total dune height can be expected (Langley Prefiled Rebuttal Testimony; Langley Prefiled Supplemental Direct Testimony, Exhibit B).

I find, based on Mr. Langley's and Mr. O'Connell's testimony, that the septic system, once exposed to waves, will cause erosion of the dune and that this effect will be significant. I further find that this erosion will increase the potential for storm and flood damage by lowering the profile of the dune. I therefore conclude

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[14] I note, however, that the witnesses' testimony relies on memories of events long past and on changes in land conditions which are difficult to observe and remember over time. Even were I to admit this testimony, I would not find it credible.

that the project does not meet the performance standards of 310 CMR 10.28(3)(c).

iv. Interfering with the Landward or Lateral Movement of the Dune

In his testimony as to the dune's landward movement, Dr. Carr made three points. He argued first that the Department erred in assuming that unimpeded dune migration is good. He urged that in this case, migration of the dune will result in filling the pond. As the pond is ecologically valuable, he contended that slowing down dune migration would be beneficial (Carr Prefiled Direct Testimony).

Second, Dr. Carr argued, again, that the dune is not migrating. He contended, based on the Shoreline Change Map, that the beach is accreting. He insisted, without other supporting evidence, that because the beach is growing, the face of the dune is either stationary or growing (Carr Prefiled Direct Testimony). Finally, Dr. Carr stated that the pilings and septic system would not really affect dune migration anyway: the impact of the pilings would be insignificant, and the new profile of the septic would be blended so as to allow sand to freely move (Carr Prefiled Direct Testimony).

Dr. Carr again restated his belief that lateral movement of the dune is not an issue because the sand on this site does not migrate in this direction (Carr Prefiled Direct Testimony). Other than noting that the beach is short and protected, he gave no basis for this conclusion.

Mr. Langley testified that the proposed septic system would interfere with dune migration. He reached his conclusion based on his and Mr. O'Connell's testimony, discussed in the previous

section, that wave conditions at the site will eventually uncover the septic system. According to Mr. Langley, the exposed surfaces of the septic system will interfere with the transport of sediment and cause accelerated erosion of the dune (Langley Prefiled Direct Testimony, Prefiled Supplemental Direct Testimony).

Mr. Langley also stated that the hardening of the dune for the driveway/parking area would impede the movement of the dune. Hardening that portion of the dune and barrier beach will lock up the reservoir of sediment below, preventing mobilization of that material. Even as the front portion of the dune attempts to move and dissipate wave energy through friction, the back portion will resist that movement, and thus the dune will no longer move in its entirety (Langley, response to ALJ question).

Dr. Carr's arguments regarding the benefit of slowed dune migration are to no avail. The Regulations do not permit me to approve the artificial slowing of dune migration for the benefit of the pond. The performance standards plainly forbid interference with dune movement.

I have previously found that the barrier beach and dune on this property are not stationary but are, in fact, moving over time (see above at 13-16). In so doing, I rejected Dr. Carr's reliance on the Shoreline Change Map as proof that the dune is not moving. I also found that the septic system will become exposed and that significant erosion will occur (see above at 29-30). I now find, based on Mr. Langley's testimony, that the exposed septic system will impede the natural movement of sediment, and that the hardening

of the driveway/parking area will interfere with the landward movement of the dune. I have no evidence regarding the lateral movement of this dune other than conclusory statements from Dr. Carr. I make no finding, therefore, about the lateral movement of the dune. Such a finding is, however, unnecessary in light of my finding that the project will interfere with the landward movement of the dune. I conclude that the project does not meet the performance standards of 310 CMR 10.28(3)(d).

v. Causing Artificial Removal of Sand from the Dune

According to Dr. Carr, the project would not cause a loss of sand from the dune. He testified that any sand removed from the driveway area would be relocated elsewhere on the site.

The Department presented no testimony on this performance standard. I conclude, therefore, that the project would meet the performance standards of 310 CMR 10.28(3)(e).

vi. Interfering with Known Bird Nesting Habitat

I have already found, based on the evidence, that the dune is not significant to the protection of wildlife habitat (see, above at 14). Thus, this performance standard does not apply here.

B. The Impact of the Project on the Coastal Beach

The Department and the Dunns have stipulated that no portion of the project would be located on the beach, and that the project would comply with the performance standards for coastal beaches (Stipulation, ¶16). This issue is thus resolved in favor of the Dunns, although it is not enough to make the proposed project approvable.

III.

I have concluded that the proposed project does not meet the performance standards for coastal dunes set forth at 310 CMR 10.28(3)(a),(b),(c), or (d). The project therefore cannot be permitted under the Wetlands Protection Act and Regulations. There is thus no need for me to decide the other issues set forth for adjudication. Accordingly, the March 22, 1989 Superseding Order of Conditions denying this project is confirmed.

This decision is a tentative decision issued in accordance with 310 CMR 1.01(10)(n)(1986 rev.). Objections to this tentative decision must be filed with the Docket Clerk within seven days from the receipt of this decision.

Kristin M. Palace
Administrative Law Judge

I adopt this Decision as my Tentative Decision in this matter.

David B. Struhs
Commissioner

SERVICE LIST
Docket No. 89-072

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