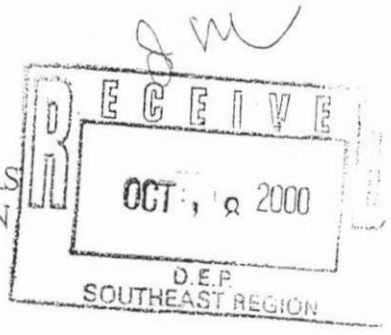
COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION



October 16, 2000

In the Matter of

DONALD KLINE

Docket Nos. 99-021, 99-022, 99-023, 99-024, 99-025, and 99-026
File No. SE 75-431
Truro

FINAL DECISION

WETLANDS - appeal from a positive superseding order of conditions. After a hearing, the superseding order is affirmed. The site consists of a natural dune remnant covered over with artificial fill made up of glacial outwash materials; the landform is stabilized by vegetation and eroding on its seaward face. In this instance, the factor that distinguishes a stable dune from a bank is the landform's ability to move landward. As there is little evidence that this landform has such an ability, it is determined that the project is proposed in the buffer zone of a coastal bank and not on a dune.

Roy A. Cramer, Esq. (Frieze Cramer Cygelman Rosen & Huber LLP), Wellesley, for petitioner Shearwater Association, Inc. and petitioner ten residents group.

John F. Shea, Esq., and Michelle N. O'Brien, Esq. (Moehrke, Mackie & Shea, P.C.), Boston, for petitioners Sam and Pamela Radin, Bernard Schoch, and Guy Strauss.

Richard A. Nylen, Jr., Esq. (Lynch, DeSimone & Nylen, LLP), Boston, for applicant Donald Kline.

Samuel J. Bennett, Senior Counsel, for the Department.

JAMES P. ROONEY, Administrative Law Judge.

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Introduction

Donald Kline seeks to build a new house on his coastal property in Truro. Whether he will get a final wetlands permit from the Department for his design depends largely on whether the landform on which he intends to build is a coastal dune or the buffer zone of a coastal bank. Determining the identity of this landform has not been easy, in large measure because the natural features of the site have been altered and re-altered by man during the last 150 years. What was once a natural dune was covered by fill and, in recent times, has been reshaped into the form of a dune.

Though the landform presents many features that could be found on either a stable dune or a coastal bank, the Department's Wetlands Protection Regulations define dune and bank so that a landform can be one or the other, but not both. After six days of hearing and testimony from numerous coastal geologists, I conclude that the project site is within the buffer zone of a bank, and not on a dune because there is little evidence that the landform has the ability to move landward, as would a dune. Accordingly, I affirm the superseding order of conditions the Department issued to Kline on February 4, 1999.

Background

Donald Kline owns a house at 6 Kestral Lane in Truro on the western shore of Cape Cod in what, to all appearances, is a striking natural setting. The house is set on a 200 foot wide bluff between Cape Cod Bay and a sizeable freshwater kettle pond known as Great Swamp. The bluff, which is the landform in question, is not entirely natural, however, due to changes that began with the construction in 1871 of a railroad along the western shore of the Cape.

The bluffs along this portion of the Cape are by and large 40 feet high, but the elevation of the landform at the site, which in the nineteenth century was probably a dune, was then 20 or so feet lower than the surrounding bluffs. To create a level surface for railroad tracks, the New York, New Haven & Hartford Railroad Company brought in fill, most likely glacial outwash material from nearby, and raised the elevation of the site to 38 feet near the shore.

After the railroad right of way was abandoned in 1960, the fill was regraded to return the site to an approximation of its natural contours. The bluff elevation was reduced to between 22 and 24 feet, which left the top of the bluff a few feet above the coastal floodplain that extends to elevation 18. The fill removed in this process was deposited between the former rail bed and Great Swamp. As a result of this work, the site slopes gently from the edge of the coastal bluff to the pond, with the exception of a few sizeable hummocks created for the express purpose of making the site look like a dune. Furthermore, as a sales brochure described it, the "estate has been landscaped as a natural dune environment with beach grass, wild roses, and clusters of pines."

The shape of the landform and its location between the ocean and a freshwater pond led the Massachusetts Coastal Zone Management Agency (CZM) to designate it as a barrier beach when it performed a barrier beach inventory of the Massachusetts coastline in the 1980s. Later, on May 26, 1998, CZM "de-designated" the landform as a barrier beach after a request to do so by an engineer working for applicant. It is the only barrier beach that CZM has "de-designated."

Kline proposes to replace the current three bedroom house, which is twelve feet from the edge of the bluff, with a larger structure set back forty feet from the edge. The new house will still have three bedrooms and therefore will not need a new septic system. Kline also proposes to add an outdoor, in-ground swimming pool, decking, and a walkway near the edge of the bluff, and to bring in fill to create a new driveway.

On April 19, 1998, Kline filed a notice of intent for the project with the Truro Conservation Commission. With the exception of the replacement of stairs leading down to the beach, he described the project as a buffer zone project. The Conservation Commission agreed with the characterization of the resource areas on the site and the nature of the project. It concluded that construction of the house and the pool would take place within the 100 foot buffer zone of a coastal bank and construction of the driveway and retaining walls associated with it would take place within the buffer zone of the bordering vegetated wetland surrounding Great Swamp. On August 19, 1998, the Commission issued an order of conditions approving the project. Because it found that the house would be in a buffer zone of a bank, and not on a dune, it allowed Kline's proposal for a house with a solid foundation and did not require that he build the house on piles.

Neighborhood residents filed five separate requests for a superseding order of conditions. The common theme of these requests was that the Commission had overlooked evidence that the site is a coastal dune. James Mahala, a coastal geologist employed by the Department, examined the site and observed what he believed to be glacial sediments characteristic of a bank on the face of the landform. On February 4, 1999, the Department

issued a superseding order of conditions approving the project and finding that the resource areas on the site included coastal bank, but not dune.

Requests for adjudicatory hearings were filed by ten residents of Truro, the Shearwater Association, which represents residents of the subdivision in which the project is located, and by individual Shearwater residents Guy Strauss, Bernard Schoch, Sam and Pamela Radin, and Joseph and Lauren Mazzella. The central issue raised in these appeals was again whether the project site is a dune.

I conducted a prehearing conference on August 10, 1999. I established the following issues for adjudication: is the landform on the site a coastal dune, a barrier beach, or a coastal bank and its buffer zone and, depending on the outcome of that question, does the project meets the performance standards for work on a dune or the performance standards for work in the buffer zone of a coastal bank. I also established issues concerning the boundaries of land subject to coastal storm flowage and bordering vegetated wetland at the site and the impact of work in the bordering vegetated wetland buffer zone on wildlife habitat. At the conference and subsequently, I granted petitioners' requests to conduct discovery of the site by probing beneath the surface of the bluff to see what lay below. Petitioners dug 17 holes 20 feet deep on the site and discovered a number of distinct soil layers. Applicant responded by digging two test pits near Great Swamp, which also revealed multiple soil layers below the surface.

I conducted a hearing on February 29, March 1, 2, and 21, and April 3 and 5, 2000. At the hearing, petitioners presented testimony from coastal geologists Stan Humphries and Sterling Wall, coastal geologist and geology professor Peter Rosen, botanist Gary Sanford, and biologist Richard Albano. Testifying for applicant were geologist Lester Smith, marine

geologist and earth sciences professor Duncan Fitzgerald, and environmental scientist John Viera, Jr.[1] James Mahala testified for the Department. I visited the site on May 19, 2000 at petitioners' request.

Discussion

I. Issues Remaining

Several of the issues that I established at the prehearing conference have become academic. After examining the site, petitioners presented no evidence contesting the delineation of the bordering vegetated wetland. They also presented no testimony that would tend to show that if the site contains a coastal bank, the work within its buffer zone would violate bank performance standards. Their witnesses testified that the site contains wildlife habitat, but this testimony assumed the site is a dune. None of them testified that work in a buffer zone would impair wildlife habitat in the bordering vegetated wetland or on a bank. Hence, that issue is relevant only if the site is determined to be a dune. Similarly the testimony concerning the boundary of land subject to coastal storm flowage at the site is relevant only if the site is a dune. That is because the dispute among the parties concerns the application of Federal Emergency Management Agency Rule 540, which applies to the calculation of floodplain boundaries in a dune zone.

This leaves the essential controversy intact: does this site contain a coastal dune or a coastal bank? After comparing the characteristics of bank and dune found in the regulatory definitions and preambles with the evidence of the characteristics of this landform, I conclude

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[1] Andrew Magee, a geologist who works in the same consulting firm as Smith, filed prefiled testimony on behalf of applicant, but I granted petitioners' motion to exclude his testimony at the hearing as duplicative of Smith's.

that it is a coastal bank because it is eroding on its seaward face and there is little evidence that it has the ability to move landward and reform itself as a dune, but not a bank, can.

II. Regulatory Definitions

To determine whether the site contains a bank or a dune, I look first to the regulatory definitions of the two resource areas. The Wetlands Protection Regulations define coastal dune as:

> any natural hill, mound or ridge of sediment landward of a coastal beach deposited by wind action or storm overwash. Coastal dune also means sediment deposited by artificial means and serving the purpose of storm damage prevention or flood control.

310 CMR 10.28(2). The Regulations define coastal bank as:

> the seaward face or side of any landform, other than a coastal dune, which lies at the landward edge of a coastal beach, land subject to tidal action, or other coastal wetland.

301 CMR 10.30(2).[2]

The landform here is at the landward edge of a coastal beach and to that extent meets at least this element of either the dune or bank definitions. But no matter how many other aspects of each definition it meets, it cannot be both because the Regulations provide that a bank is "other than a coastal dune." In order to figure out which it is, I must compare the physical features of the site with features identified as significant by the regulatory language.

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[2] The definitions played a key role in defining the issues here. The Regulations define bank as the "seaward face" of a landform, while treating a dune as the entire landform. Therefore, when drafting issues concerning the project, which is proposed for the top of the landform, I asked whether it meets the performance standards for work on a dune or the performance standards for work in the buffer zone of a bank.

III. Site Description

I begin with the era that formed present day Cape Cod -- the end of the last glacial age. As the glacier receded about 17,000 years ago, glacial streams deposited a mix of sediments on what is now the Cape. Occasionally a block of ice became trapped in these outwash deposits. When the block melted what remained was a kettle pond. This is the process that created Great Swamp. When it was first formed, it was surrounded on all sides by glacial outwash deposits.

As the glacier continued to retreat, the sea rose and the Cape began to resemble its current shape. Between Great Swamp and the sea were glacial outwash deposits that doubtless rose to the same height as the other nearby glacial deposits. At some point as the sea advanced, it began to erode away the western side of the original kettle pond. At present, the glacial material on the western side of the pond conforms to the shape of a cut bowl. The coastal banks to the north and south of the site are formed of glacial outwash deposits 40 feet high, but this material takes a dip at the site until it reaches a low point of 3.4 feet.[3] This is below the height of the beach, so that this glacial layer is not visible on the exposed surface of the landform at the center of the site.

What if anything replaced the glacial deposits that were lost to the sea? Petitioners' subsurface exploration discovered a layer of well-sorted sand just above the glacial deposits

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[3] Petitioners, in analyzing their core samples, described this material as "other" rather than as glacial. Peter Rosen testified for them that, without comparing sediments from this material with samples of sediments from nearby glacial deposits, he could not say for certain whether the material was a glacial or a post-glacial deposit. The only logical explanation for the curved shape of this layer, however, is that it reflects the original shape of a kettle pond formed at the end of the glacial era.

that is consistent with the type of sand found in a natural dune. Though there was some dispute as to the existence of an historic dune at the site and the size of the dune if there was one, I am convinced that this layer of sand reflects a natural dune in existence prior to construction of the railroad. Applicant's geologist Lester Smith conceded at the hearing that wind would have tended to deposit sand at the site once the glacial material disappeared. This layer of sand is also shaped like a dune with a crest of 16 to 18 feet near the shore that gently slopes toward Great Swamp.

Petitioners also found evidence that the dune had long existed prior to construction of the railroad and had migrated landward as the ocean advanced. Petitioners found peat deposits below the sand from the center of the landform back to the pond. Carbon dating of a sample of the peat showed that it was formed around 540 A.D. Thirty feet from the pond, petitioners also discovered layers of peat "interfingered" with sand. The geologists all agreed that this demonstrates that historically windblown sand mixed with peat as the dune moved landward and the ocean advanced.

What happened to the preexisting landform during railroad construction is disputed. I credit the testimony that the railroad simply deposited a layer of fill on top of the existing dune, rather than reworking the sand at the site. The sand contains horizontal layers of dark vegetative material that are inconsistent with sand movement by the railroad and consistent with a preexisting natural dune that was stable and heavily vegetated for a period of time.[4]

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[4] Lester Smith and Duncan Fitzgerald, applicant's geologists, question whether the layers of vegetative material reflect a remnant of an intact dune. They maintain that beach grass rhizomes would still be evident if a vegetated dune that was above the water table were covered over. Peter Rosen, one of petitioners' geologists, asserts that rhizomes would break down after 150 years. Whatever the relative merits of this scientific dispute, the fact remains that there are

Though there is some evidence of disturbance of the sand in one portion of the site down to seven feet in elevation, this was in an area used as a salt works prior to the railroad. The undisturbed sand in the remainder of the site that extends up to 16 to 18 feet better reflects the natural height of the dune.

The fill material overlying the dune sand is poorly sorted, mostly sandy material that is consistent with nearby glacial outwash deposits. At present, it varies in thickness from 4 to 14 feet. On top of the fill is a discontinuous, thin veneer of fine sand, that at its thickest point (at the edge of the bluff) is eighteen inches deep. The bluff is heavily vegetated with American beach grass and poison ivy near the edge, with occasional stands of pine trees farther back. At the foot of the bluff, sand is collecting in a form that all parties agree is a dune. What was particularly striking to see during the site visit was that in this area of the coast, which is at least for the moment receding faster than the adjoining areas (ten feet in the ten years between 1986 and 1996, as opposed to 2 - 5 feet nearby), sand is accumulating in markedly greater amounts than along the banks to the north and south.

IV. Analysis

A. Artificial Dune Definition

Petitioners maintain that the landform on the site is a dune made up of a buried natural dune with an artificial dune on top of it. They argue that the regraded railroad fill should be considered an artificial dune because all that the regulatory definition of artificial dune requires is that the material serve "the purpose of storm damage prevention or flood control,"

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horizontal vegetative layers in the buried sand and no plausible explanation for their occurrence other than that they occurred naturally.

which the fill does. See 310 CMR 10.28(2). Applicant and the Department respond that the fill has capped the underlying sand, that the resulting landform does not behave like a dune, and hence it must be a coastal bank.[5] They assert that this bank serves as both a buffer protecting inland areas from storm damage and a source a sediment for the beach.

I do not find petitioners' reading of the definition of artificial dune persuasive. If petitioners were correct, any sediment deposited artificially along a coast that served the interest of storm damage prevention would be a dune and not a bank. The Regulations recognize, however, that both banks and coastal dunes, whether natural or artificial, serve the interest of storm damage prevention in coastal areas. See 310 CMR 10.30(3). Hence, the presence of sediment in a coastal area that serves a storm damage prevention function does not by itself provide enough information to determine whether it is a bank or a dune.

B. Dune vs. Bank Characteristics

I look next to the coastal dune regulation preamble to see if it provides any assistance. The preamble describes certain dune characteristics that are "critical to the protection" of storm damage prevention and flood control interests including:

(a) the ability of the dune to erode in response to coastal beach conditions;
(b) dune volume;

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[5] The Department argues that use of the type of fill found here would not be permitted today as part of a dune restoration project. I do not find this dispositive. I look instead to see whether the fill behaves similarly to dune sand. Duncan Fitzgerald testified for applicant that it does not. He said that if "the underlying fill becomes exposed to wind processes, the fine-grained clay, silt and fine sand will be blown away. Gradually a lag deposit of coarse sand and gravel will form on the surface." Peter Rosen responded for petitioners that the fill is "functionally consistent with dune sand" because it is "primarily composed of sand which can be reworked by wind and [the] gravel lag deposit [that will remain after the sand is reworked] is typical of natural dune processes in areas of storm overwash." A resolution of this dispute turns on what has actually happened at the site over the last thirty years.

(c) dune form, which must be allowed to be changed by wind and natural water flow;
(d) vegetative cover;
(e) the ability of the dune to move landward or laterally ...

310 CMR 10.28(1).

The significant factor in determining whether the landform here is a dune is the ability of a dune to be changed by wind and water and to move landward.[6] The coastal dune preamble states that in order for a coastal dune to serve storm damage prevention and flood control functions, "coastal dune volume must be maintained while allowing the coastal dune shape to conform to natural wind and water flow patterns." Furthermore, "[o]n retreating shorelines, the ability of coastal dunes ... to move landward at the rate of shoreline retreat allows these dunes to maintain their form and volume, which in turn promotes their function of protecting against storm damage or flooding." 310 CMR 10.28(1).

There is little evidence here that the landform is moving landward. All parties agree that a dune, particularly if it is as heavily vegetated as is this landform, can be stable for a significant period of time. The question then becomes, does this landform have the ability to move, even if it is not moving much now? If it were a bank, it would lack this ability.

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[6] As for the other factors, the landform is in the form of a dune, but that is not very helpful in determining whether it is a dune because its present shape was deliberately created to mimic a dune form.

The landform erodes and supplies sand to the coastal beach. It is also higher than the coastal beach and thereby protects inland areas from storm damage. These are dune characteristics described in the preamble, but they are also characteristics of a coastal bank that is both a sediment source for the beach and a vertical buffer protecting inland areas. Compare 310 CMR 10.28(1) and 310 CMR 10.30(1). The landform erodes in a manner different from a natural dune, however, because it is not made up of fine sand throughout. Here, the evidence is that storms erode the underlying dune sand first and at some point undercut the overlying fill until it collapse and slumps onto the face of the landform. I do not find this significant in resolving the issue because by itself it says little about how the landform as a whole functions.

The evidence shows that while the landform eroded 10 feet landward between 1986 and 1996, there was little buildup of sand on the other side of the landform that would suggest landward movement. The top of the landform is above the 100 year floodplain; therefore, storm water cannot wash over the top and move sediments landward, as is the case with some dunes. But there is no evidence that the natural dune that was at the site prior to the railroad's placement of fill ever developed in this fashion. It appears to have been created by wind and to have moved landward as a result of the wind. Hence, if the landform could move now, the likely source of movement would also be wind.

The wind forces that long ago created a dune at this site are still at work today. Wind has left sand in a dune form at the base of the landform and in greater quantities than at the base of nearby banks. This sand is fairly continuous with the slope of the landform. There is also at the edge of the landform an 18 inch layer of sand on top of the fill that came from somewhere below and was blown upward.[7]

The 18 inch layer of sand at the edge of the landform indicates that wind is creating something dune-like. Many of the coastal banks on the Cape also have dunes on top of them, however. Accordingly to Mahala, the difference between wind- blown deposits on top of a

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[7] A dispute exists among the parties as to whether this dune sand is being blown up and over the top of the landform so as to contribute to any landward movement. Applicant's geologists say the sand came from just below on the face of the landform. Petitioners' geologists maintain that sand is transported from beach level up the face of the landform by an "Aeolian ramp." Sterling Wall claims to have seen sand blown in this fashion over the top of the landform.

While the parties make much of this dispute, I am not convinced that it is of great importance. The parties all agree that wind can create dunes of far greater height than the landform here. There are, for example, wind-formed dunes 100 feet high in Provincetown. Therefore, it is conceivable that wind could blow sand over the top of this twenty four foot high landform. The issue is whether wind is doing so here in a manner that suggests that the landform can move.

dune and wind-blown deposits on top of a bank is that dunes on top of a bank are not an integral part of the landform; they simply sit on top of it. Here, the sand is seen as a distinct layer separate from the underlying fill if a hole is dug through it. On the surface, however, it appears to be continuous with the rest of the landform and vegetated in the same way. It thus is fairly well integrated into the landform, yet it retains a distinct character.

More deposited sand would suggest that the forces tending to create and move a dune were predominating. That is not the situation here. As described by the geologists, a vegetated wind-formed dune grows as sand is trapped by the beach grass growing on a dune. As more sand is added, the beach grass grows through it and the process continues. This site is vegetated with beach grass, so that if sand were blowing across the top of the landform in any quantity this process should trap the sand and add to the landform. But now, thirty years after the area was regraded, there is only a thin, discontinuous veneer of sand on the landform.

Duncan Fitzgerald testified that if the landform were moving, there would be evidence of it heading in the direction of Great Swamp. The interfingering of peat and sand found in petitioners' core samples that demonstrates historic dune movement into the pond would also be evident in the top of core samples he took near the current pond edge, according to Fitzgerald. He acknowledged that in these cores, there is a layer of sand at the top. Based on his experience examining other sites, it was his opinion that stormwater runoff carried this sand to the low point of the area at the edge of the pond; had wind done so, it would have deposited sand throughout the area. Whether he is right or not, the samples near the pond or on the backside of the landform do not show sand deposition that would be in any way

proportional to the considerable amount of material lost to the sea from the face of the landform in the last few years.

Petitioners argue in a final brief that it is the vegetation on the surface rather than the fill underneath that is hindering movement by the landform. Heavy vegetation on a dune does hinder dune movement, but it does not necessarily prevent it. According to Fitzgerald, who has studied a number of heavily vegetated dunes on the Cape, so long as there is a supply of sand, a heavily vegetated dune will grow vertically and move horizontally in the direction of the wind. That does not appear to be happening here. The face of the landform is eroding and there is no compensating movement of the landform inland.

By all accounts, at some time in the future, the landform will erode to the point where its height will be below the 100 year flood elevation of 18 feet. At that point, a storm can overtop the landform and begin to wash away the fill, returning the site to a dune. But at present, with the relic dune buried under glacial fill that is at least four feet deep and that has created a ridge rising above the floodplain, the fill appears to have substantially hindered dune processes at the site.

The landform functions predominantly like a coastal bank and not a coastal dune. It erodes when waves strike it during a storm, like a bank, but does not reform, like a dune. The ten feet of the landform that eroded between 1986 and 1996 amounted to 96,000 cubic feet of material lost from the landform and not replaced by any comparable volume of windblown sand. For this reason, I conclude that the site contains a coastal bank and not a coastal dune.

As I stated at the outset, the petitioners offered no evidence that if the project is in the buffer zone of a bank, it would violate any bank performance standards. I therefore also conclude that the project meets bank performance standards.

C. Barrier Beach

Petitioners claim that even if the site contains a bank, this would not preclude the landform from being treated as a barrier beach protecting the freshwater of Great Swamp from saltwater intrusion by the ocean. But whether or not the definition of barrier beach as "a narrow low-lying strip of land generally consisting of coastal beaches and coastal dunes," 310 CMR 10.29(2), allows for the possibility that a coastal bank can be part of a barrier beach, the applicable performance standards negate any need to consider the question here. The Wetlands Protection Regulations do not contain performance standards peculiar to work on barrier beaches; rather, they apply the performance standards for work on coastal beaches and coastal dunes "to the coastal beaches and all coastal dunes which make up a barrier beach." 310 CMR 10.29(3). Hence, even if a barrier beach could include a coastal bank, the barrier beach regulations would not apply any performance standards to proposed work on the bank.

V. Ruling on Petitioners' Motion for a Tentative Decision

Petitioners moved orally at the close of the hearing for a tentative decision and followed that up with a written motion. They maintain that a tentative decision is justified in light of novel questions concerning the interplay of the dune and coastal bank regulations and the peculiarity of the site. I informed the parties at the hearing that if I decided simply that the resource area on the site was either a coastal bank or a dune I would not issue a tentative

decision. As I have resolved the case by deciding that the resource area is a coastal bank, I see no reason to issue a tentative decision. While the legal and factual issues presented are novel and difficult, I do not find that the interests of justice warrant a tentative decision.

Conclusion

The superseding order of conditions is sustained and made final.

Reconsideration and Appeal

The parties to this proceeding are hereby notified of their right to move for reconsideration under 310 CMR 1.01(14)(d) by filing a motion with the Docket Clerk and serving it on all other parties within seven business days of the postmark date of this decision. Any party moving for reconsideration must state the factual grounds and legal provisions it relies on to support its motion.

Any party may appeal this decision to Superior Court, under M.G.L. c. 30A, §14(1). The complaint must be filed in the Court within thirty days of receipt of this decision.

James P. Rooney
Administrative Law Judge

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I adopt this Decision as my Final Decision.

Lauren A. Liss
Commissioner

fd.kli

SERVICE LIST

In The Matter Of: Donald Kline

Docket Nos. 99-021, 99-022, 99-023, 99-024, 99-025, 99-026 File No. 75-431

Representative	Party
Richard A. Nylen, Jr., Esq. Lynch, DeSimone & Nylen, LLP 12 Post Office Square Suite 600 Boston, MA 02109	APPLICANT Donald Kline
Roy A. Cramer, Esq. Frieze, Cramer, Cygelman, Rosen & Huber LLP 372 Washington Street Wellesley MA 02481	PETITIONER Shearwater Association, Inc. (Docket # 99-021) and PETITIONER Ten Citizens Group (Docket # 99-022)
John F. Shea, Esq. Donald P. Nagle, Esq. Moerhke, Mackie & Shea, P.C. 137 Newbury Street, 6th Floor Boston, MA 02116	PETITIONER Guy Strauss (Docket # 99-023) and PETITIONER Bernard Schoch (Docket # 99-024) and PETITIONER(S) Sam and Pamela Radin (Docket # 99-026)
Joseph F. Mazzella Lauren Mazzella 115 Boyle Street Weston, MA 02493	PETITIONER(S) (Docket # 99-025)
Samuel Bennett, Esq. DEP – Office of General Counsel One Winter Street, 3rd Floor Boston, MA 02108	DEPARTMENT Dept. of Environmental Protection
cc:	
James Mahala DEP – Southeast Regional Office 20 Riverside Drive Lakeville, MA 02347	DEPARTMENT Dept. of Environmental Protection

Truro Conservation Commission
Town Hall Road
Truro, MA 02666

CONCOM

Date: October 16, 2000