

FILLED WATER'S EDGE  
POLICY ASSESSMENT

JUNE, 1983

An Issue Paper

David A. Stern  
Thomas Moritz  
Kevin B. Keenan

New Jersey Department of Environmental Protection  
Division of Coastal Resources  
Bureau of Coastal Planning and Development  
CN-401 Trenton, New Jersey 08625

Property of  
NJDEP

Information Resource Center

DEP  
HT  
393  
N45  
584  
1983

TABLE OF CONTENTS

	<u>Page</u>
1.0 BACKGROUND	1
1.1 The Problem	1
1.2 Study Method	1
1.3 Definitions	2
2.0 STUDY AREA	3
2.1 Geographic Scope	3
2.2 Water's Edge Inventory	3
3.0 LOCATION SUITABILITY ANALYSIS	4
3.1 Prototypical Designs	4
3.1.1 Marinas	4
3.1.2 Housing	4
3.2 Siting Criteria	4
3.2.1 Shellfisheries	7
3.2.2 Compatability	7
3.2.3 Undeveloped Land	7
3.2.4 Tax Rates	7
3.2.5 Wetlands	8
3.2.6 Road Access	9
3.2.7 Utility Access	9
3.2.8 Water Access	9
3.3 Factor Combination	10
3.3.1 Eliminate Unacceptable Sites	10
3.3.2 Rate Remaining Sites	10
4.0 FINDINGS AND CONCLUSIONS	13
5.0 IMPLICATIONS AND RECOMMENDATIONS	13
5.1 Water Dependent Uses	14
5.2 Filled Water's Edge Policy	14
5.3 Marina Conversions	14
REFERENCES AND DATA SOURCES	16
APPENDIX A: Derivation of Cost Threshold	17
APPENDIX B: Site Suitability Ratings	20
APPENDIX C: Recommended Policy Revisions	

Property of  
NJDEP  
Information Resource Center



## 1.0 BACKGROUND

### 1.1 The Problem

The problem with the Filled Water's Edge policy of New Jersey's Rules on Coastal Resource and Development Policies is two-fold. First, the policy is ambiguous making it difficult to apply. The source of ambiguity are the phrases "water dependent use" and "waterfront portion of the filled water's edge." Second, the effect of the policy on coastal development is unclear. Is the policy achieving its stated intent to preserve the waterfront for "water dependent uses" and to promote public access along the water's edge? Is the policy furthering other, perhaps latent objectives such as preserving sites for marina development or, at a minimum, preventing the erosion of services available to New Jersey's boating public?

Related to the question of marina development on the filled water's edge is the issue of marina conversions. Despite the shortage of marinas in New Jersey (see N.J. Department of Environmental Protection 1982, p. 17), a significant number of coastal permit applications have been submitted which propose to convert all or part of an operating marina into other uses, predominantly housing.

The Rules on Coastal Resource and Development Policies state, "Marinas are a key element in New Jersey's coastal resort economy. The maintenance of existing marina areas and the protection of these areas from competing uses which would detract from the recreational service they provide is, therefore, a high priority." (N.J.A.C. 7:7E-3.10c). If the marina industry is to be promoted in the State then should marina conversions be discouraged or prohibited?... On what grounds?

The problems and questions arising from the current Filled Water's Edge Policy suggest a need to do the following:

- Define both water dependency and filled water's edge in clear and defensible terms which reflect the State's objectives.
- Define a full service marina, identify its components and site requirements. Also identify site requirements for housing development.
- Determine the supply of filled water's edge sites that are suitable for marina development and note those which could also accommodate housing development (i.e., locations where housing need not preempt marina development).
- Formulate recommendations on these issues and draft policy revisions.

### 1.2 Study Method

These tasks were integrated into a location suitability analysis which began with an inventory of the State's filled water's edge and culminated with an assessment of 37 randomly selected locations. The location suitability procedure, described in detail in Section 3.0, entailed the following steps:

1. Develop generalized designs for both a full service marina and multi-family housing.
2. Formulate siting criteria by identifying relevant factors (e.g., wetlands) and rating each attribute, or characteristic, for each factor (e.g., (a) no wetlands, (b) wetlands with adequate buffer, (c) wetlands with inadequate buffer...).
3. Evaluate factors by attribute for each site.
4. Develop and apply rules combining factors to exclude clearly unacceptable sites.
5. Develop and apply rules combining factors to identify the relative suitability of remaining acceptable sites.

Due to the small sample size, a large margin of error should be assumed in generalizing the sample findings to the entire coastal zone. Thus, necessarily broad, but nonetheless useful, conclusions are drawn from the analysis.

### 1.3 Definitions

The definitions presented below, taken from NJDEP Rules on Coastal Resource and Development Policies, are integral to the study.

- Filled Water's Edge (N.J.A.C. 7:7E-3.17) -- Filled Water's Edge areas are existing filled areas lying between Wetlands or Water Areas, and either: (1) the upland limit of fill, or (2) the first public road or railroad landward of the adjacent Water Areas, whichever is closer to the water. Some existing or former dredge spoil and excavation fill areas are Filled Water's Edge Area.
- Natural Water's Edge -- For the purposes of this study all edge types are considered natural except for filled land and wetlands (i.e., includes natural water's edge-floodplains, alluvial flood margins, beach and dune systems, central barrier island corridor, cranberry bogs, wet borrow pit margins, coastal bluffs and intermittent stream corridors).
- Wetlands (7:7E-3.26) -- Wetlands are areas where the substrate is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions which are subject to the Wetlands Act, or the Coastal Area Facility Review Act (CAFRA), or the Waterfront Development Law.
- Water Dependent (7:7E-1.6(c)) -- "Water Dependent" means development that must have direct access to the body of water along which it is proposed in order to function. Maritime activity, commercial fishing, public waterfront recreation and marinas are examples of water dependent uses, but only the portion of the development requiring direct access to the water is water dependent. The test for water dependency shall assess both the need of the proposed use for access to the water and the capacity

of the proposed water body to satisfy the requirements and absorb the impacts of the proposed use. A proposed use will not be considered water dependent if either the use can function away from the water or if the water body proposed is unsuitable for the use. For example, in a maritime operation a dock or quay and associated unloading area would be water dependent, but an associated warehouse would not be water dependent. Housing, hotels, motels, casinos and restaurants are not water dependent.

## 2.0 STUDY AREA

### 2.1 Geographic Scope

The study area encompasses all portions of New Jersey's coastal zone, including the Atlantic seaboard, back bays, Delaware and Raritan Bays and Rivers and the northern New Jersey waterfront. All shorelines are included where the adjacent waterway is of sufficient width that the National Ocean Survey (NOS) navigation charts note the waterway depth regardless of the actual depth.

Although non-tidal waterways such as small rivers, lakes and reservoirs may support marinas, most types of marinas require a coastal location or, at a minimum, direct access to the coast. These include marinas serving commercial fishing and deep sea charter, long-distance power boat cruising, long-distance sailing, estuarine fishing and day sailing and racing (see Rogers, Golden and Halpern, 1982). Hence, inland waterways are excluded from the study.

### 2.2 Water's Edge Inventory

Using the U.S. Soil Conservation Service (SCS) Soil Survey maps, the 753 miles of navigable shoreline in the study area including tidal rivers, bays, inlets, etc. were categorized and measured as follows\*:

Filled Water's Edge	281 miles	(37%)
Wetlands	342	(46%)
Natural Water's Edge	130	(17%)
Total	753 miles	(100%)

Once the filled water's edge was identified and delineated on a 1:250,000 scale map, a 50% random sample of filled water's edge locations (each approximately 5,000 feet in length) were selected to determine the percent that are largely undeveloped. Of the 148 locations sampled, 49, or 33%, had at least three contiguous acres of land undeveloped according to the 1972 series 1:24,000 USGS photo quads. Roughly 19 miles (3%)\*\* of New Jersey's navigable shoreline have undeveloped filled water's edge parcels large enough to support a full service marina.

\* Islands without road access were excluded from the inventory while both shorelines of rivers and streams were included. Also, the amount of filled water's edge identified is probably overstated since several soil classes did not distinguish man-made fill from natural accretion.

\*\* Average length of undeveloped shoreline at filled water's edge locations was an estimated 1000'.

### 3.0 LOCATION SUITABILITY ANALYSIS

#### 3.1 Prototypical Designs

##### 3.1.1 Marinas

A 100 slip full service marina comprised of the following components was assumed to be the basis for assessing sites (see N.J. Department of Environmental Protection 1982 and Mean's Guide 1981). Parenthetically, the average size of marinas in the coastal zone is 88 slips.

Components essential to a marina's operation:

- a. Boat launch -- 20 foot wide
- b. Parking -- 400 sq. ft./parking space, 0.8 parking spaces/slip;  
Total = 32,000 sq. ft.
- c. Marina office -- 28,600 sq. ft (including items b and c below)

Components directly-related to boating:

- a. Boat repair -- 8,300 sq. ft.
- b. Boat and accessory sales (included in marina office space)
- c. Boat equipment and supplies sales (included in marina office space)
- d. Fuel depot -- 15' x 40' or 600 sq. ft.
- e. Locker room and dry storage -- 12,000 sq. ft.

The total square footage of structures and paving for a full service marina, as defined above, is 81,500 square feet or 1.87 acres. One possible layout for a marina is depicted in Figure 1. The site covers a total of 3.0 acres of land, with about 40% as open space. If the open space was reduced to the current minimum requirement of 20%, the total acreage for a full service marina would be 2.24 acres.

##### 3.1.2 Housing

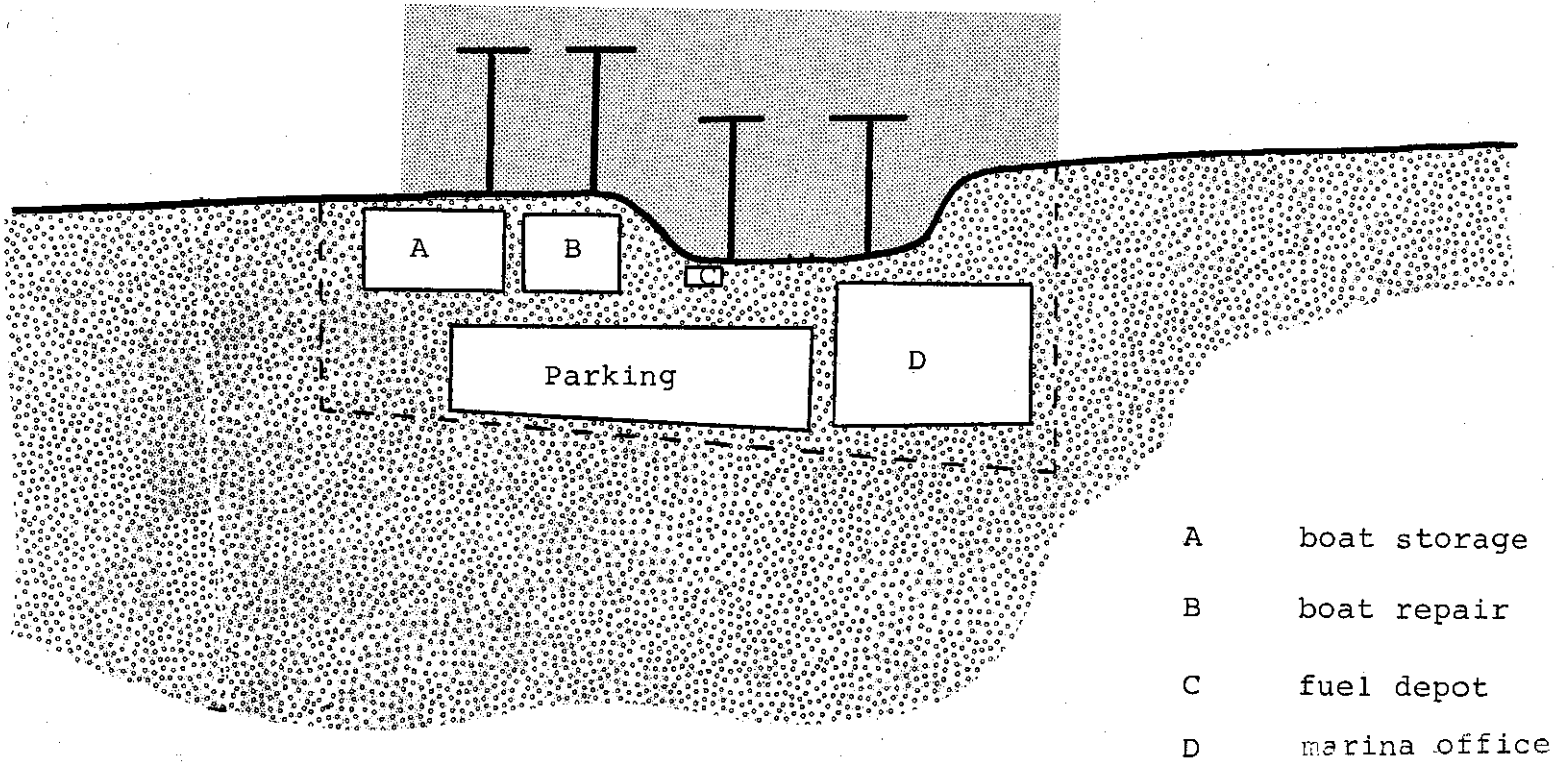
Two sizes of townhouse development, 100 units and 25 units, were assumed as the basis for assessing the feasibility of accommodating housing on a filled water's edge site. The townhouses would have 1,600 square feet of interior space and two parking spaces per dwelling unit and appear suburban with about 30% open space (see Figure 2). Given these assumptions 25 units can be accommodated on a two acre parcel, thus eight acres could accommodate 100 units. The size of the larger configuration generally corresponds to the proposals from marina conversions submitted to date.

An 11 acre parcel would be required to support both a large, 100 unit townhouse development and a 100 slip, full service marina.

#### 3.2 Siting Criteria

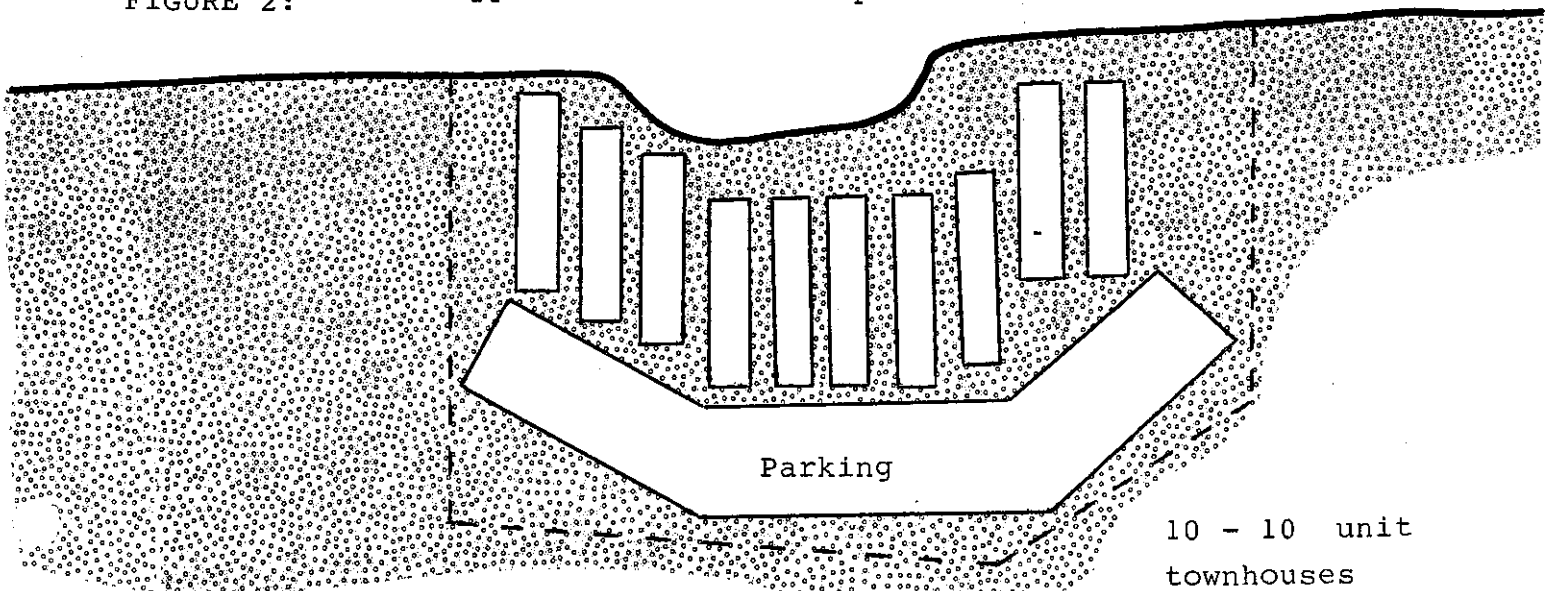
The siting criteria used to evaluate the suitability of sites with respect to marinas and housing, with an emphasis on marinas, are but a small subset of those that would be applied in a detailed site analysis. The

FIGURE 1: Prototypical Marina



Scale 1:2400

FIGURE 2: Prototypical Townhouse Complex



Scale 1:2400

factors which encompass environmental, development potential and socio-economic considerations indicate the range of factors that could be useful in a more rigorous analysis as well as those key factors that were applied in this study:

TABLE 1: Siting Criteria

<u>Environmental Sensitivity Factors</u>	APPLICABLE USE TYPE*	
	<u>Marina</u>	<u>Housing</u>
Shellfisheries	●	--
Finfisheries	0	0
Wetlands	●	●
Submerged Vegetation	0	0
Endangered and Threatened Vegetation	0	0
Endangered and Threatened Wildlife	0	0
Floodplains and Runoff	0	0
Erosion and Sedimentation	0	0
Water Quality	0	0
<u>Development Potential Factors</u>		
Tax Rate	●	●
Undeveloped Land	●	●
Road Access	●	●
Water Access - Embayment	0	--
Water Access - Channel	●	--
Public Sewer	●	●
Public Water Supply	●	●
Tidal Variation	0	--
Competition	0	--
Land Ownership	0	0
Public Transportation	--	0
Soil Characteristics	0	0
Wetland Reclamation	●	0
<u>Socio-Economic Factors</u>		
Fuel Storage Safety	0	--
Traffic Congestion	0	0
Ratables (i.e., municipal fiscal effects)	0	0
Security	0	0
Low Cost Housing Demand	--	0
Displacement of Existing People	0	0
Public Access to Waterfront	0	0
Compatibility with Adjacent Uses	●	●

\*Factors included in siting study are indicated by solid bullets (●), dashes (--) indicate not applicable.

Sites were rated for each factor according to the factor types, or attributes, of each site. The choices of attributes indicating location suitability, ranging from best to worst, are presented below along with the rationale for each factor. For factors evaluated in terms of cost, the cost equation is presented.

### 3.2.1 Shellfisheries

Shellfishing is a viable recreational and commercial activity in many New Jersey waterways. Destruction or disruption of valuable shellfish habitat could produce substantial adverse ecologic and economic effects.

1. No harvestable shellfish.
2. Moderate commercial value and/or recreational value of shellfish on-site.
3. High commercial value of shellfish on-site.

### 3.2.2 Compatibility

Compatibility is the co-existence of land uses without aesthetic or functional conflict. Compatibility can be achieved through a combination of two strategies: (1) locate new development adjacent to uses that do not present conflict; and (2) provide sufficient buffer in the form of vegetated open space to minimize potential conflict. It was assumed that all commercial land uses would be compatible with marinas, adjacent residential uses would require limited (50') buffers and the obtrusive sights, sounds and smells associated with industrial uses would require large (250') buffers.

1. No development or commercial development adjacent.
2. Residential development adjacent with adequate (50') buffer and/or industrial development adjacent with adequate (250') buffer.
3. Industrial or residential development adjacent, inadequate buffer.

### 3.2.3 Undeveloped Land

As presented in section 3.1 "Prototypical Designs" a 100 slip full service marine requires 3 acres of land, a 25 unit townhouse development requires 2 acres and a 100 unit townhouse complex requires 8 acres.

1. 11 acres or more, marina and 100 housing units.
2. 5-10.9 acres, marina and 25 housing units.
3. 3-4.9 acres, marina only.
4. less than 3 acres, neither marina nor housing.

### 3.2.4 Tax Rates

The underlying assumption for considering tax rates was that the greater the tax rate, the greater the financial burden on the proposed

development. The factor was ranked accordingly, with the lowest tax rates as the best rating, and conversely, the higher tax rates as the worst ratings. Even though high property taxes may deter some development, high taxes alone would not preclude development. Besides, higher property taxes often reflect a higher level of government services.

1. Less than \$2.00/\$100.00 of assessed value.
2. \$2.00 - 2.99/\$100.00 of assessed value.
3. \$3.00 - 4.00/\$100.00 of assessed value.
4. Greater than \$4.00/\$100.00 of assessed value.

### 3.2.5 Wetlands

Wetlands are valued for many reasons. They stabilize soil by retarding erosion and runoff, promote infiltration of surface water, provide food, shelter and breeding sites for wildlife and provide aesthetic benefits as well. Wetlands were considered in a two-step process. First, sites were evaluated based on their proximity to wetlands as categorized below.

1. No wetlands.
2. Wetlands either on-site or adjacent, greater than 100' buffer possible.
3. Adjacent wetlands, less than 100' buffer possible.
4. Wetlands on-site, no buffer possible.

Second, for those sites with a limited amount of wetlands along the water's edge (0.25 acre) the cost of filling the wetlands and creating an equal amount elsewhere was computed. The cost of wetlands reclamation in dollars (W) was determined as follows:

$$W = (E + P + L) (A)$$

where; E = excavation and filling costs @ \$8,000/acre,  
P = planting costs @ \$5,000/acre,  
L = land costs @ \$36,200/acre,  
A = amount of wetlands to be reclaimed in acres.

Thus, the cost of wetlands reclamation is estimated to be \$49,200 per acre or \$12,235 per site having 0.25 acres of wetlands on-site.

SOURCES: Discussion with Jim Schmid, private consultant, Media, Pennsylvania.

Interviewed marina operators.

Energy Facility Development Potential Study, 1981.

### 3.2.6 Road Access

Both marina and townhouse development require access via a paved, medium level of service road to a paved road. Although access to a major arterial would be preferable since it would offer easier access and greater visibility, quantifying these advantages would be difficult at best. Thus, road access was evaluated for each site on the basis of cost, if any, of constructing a 24' wide paved road to link-up with the nearest paved road. Road access costs in dollars (R) were computed as follows:

$$R = 76 (L)$$

where; L = road length in feet measured from the perimeter of a site to the nearest road.

SOURCE: Energy Facility Development Potential Study, 1981.

### 3.2.7 Utility Access

Utility access is the extension of electric, sewer and water lines from the main, trunk lines to the perimeter of a site. The costs of running utilities to a site in dollars (U) were computed on the basis of the following assumptions; (1) necessary utilities run either under or over all paved roads; and (2) water supply and sewerage pipes have pipe diameters of 2" and 6", respectively.

$$U = 11.4(E) + 14.4(W) + 30.0(S)$$

where; E = length of electric line in feet,  
W = length of water line in feet,  
S = length of sewer line in feet.

SOURCE: Discussion with Ed Zimmerman, Engineer, Atlantic Electric. Energy Facility Development Potential Study, 1981.

Since all utilities for a given site measured the same, this equation translates to a total utility access cost of \$55.80 per foot.

### 3.2.8 Water Access

Water access, the ability to get to a potential marina from the water, was evaluated in terms of the cost, if any, of dredging an access channel and a boat basin of ample depth. Since a significant portion of the boats that use New Jersey marinas are smaller crafts with relatively shallow drafts, 6' was assumed to be an ample depth for water channels and basins. In fact, 63% of New Jersey's marinas have a maximum draft of 6' or less. It was also assumed that; (1) a marina's boat basin would cover an equal area as the support facilities on land, namely 3 acres for a 100 slip marina; and (2) an access channel would be 120' wide. Water access, or dredging costs in dollars (D), were computed as follows:

$$D = 3.07(V)$$

where; V = volume of material to be dredged including access channel and boat basin in cubic yards.

### 3.3 Factor Combination

A composite suitability rating was determined for each site through a modified rules of combination procedure. This procedure requires formulating rules which assign suitabilities to sets of factor types, or attributes, based on logical combinations expressed in verbal rather than arithmetic terms (see Hopkins 1977, p. 386).

The rules presented below were applied to first, eliminate unacceptable sites, and second, to identify the relative suitability of the remaining sites assigning a rating of EXCELLENT, GOOD or FAIR. The rules define the suitability of the three development configurations; a full service 100 slip marina developed alone or associated with either a 25 or 100 unit townhouse complex. The maximum development configuration depends on the extent of undeveloped land for a particular site. All site improvement costs are stated in 1981 annualized dollars.

#### 3.3.1 Eliminate Unacceptable Sites

Step a. -- apply rules pertaining to non-cost factors. RULE 1: Sites with the lowest possible rating for any non-cost evaluated factor except "Shellfisheries" and "Tax Rate" are unacceptable (i.e., lowest rating overrides all others). RULE 2: Sites with a high commercial value shellfishing (rated 3) and which require dredging are unacceptable.

Step b. -- apply cost threshold. RULE 3: Eliminate sites with excessive site improvement costs, that is, greater than \$15,700 (annualized dollars). See appendix for derivation of cost threshold.

#### 3.3.2 Rate Remaining Sites

Step c. -- compute the average of the 5 non-cost ratings for each site (i.e., shellfisheries, compatibility, developed land, tax rates and wetlands).

Step d. -- rate site improvement costs. This step entails summing site improvement costs for each site, stratifying the resulting total site improvement costs and assigning a numeric rating to each strata. RULE 4: Site improvement costs are rated from best to worst as follows:

Less than \$4,000 = 1  
\$4,000 - \$9,999 = 2  
\$10,000 - \$15,700 = 3  
Greater than \$15,700 is unacceptable

Step e. -- combine cost and non-cost ratings for each site. This final step entails adding the composite non-cost ratings computed in Step c. to the cost ratings assigned in Step d. The resulting totals are then stratified and assigned a final site suitability rating. RULE 5: Rate sites as follows:

Less than 3.1 = EXCELLENT  
3.1 - 4.2 = GOOD  
Greater than 4.2 = FAIR

TABLE 2: Unsuitable Sites Largely  
Too Expensive to Develop

<u>Eliminated Site*</u>	<u>Composite Rating</u>	<u>Reason(s) for Eliminating</u>
1. Woodbury	5.2	\$29,275 annual site improvement cost exceeds threshold of \$15,700
2. Bridgeport	5.0	\$53,707 cost excessive
3. Marcus Hook	5.2	\$25,726 cost excessive
4. Marcus Hook	5.6	\$36,723 cost excessive
5. Taylors Bridge	5.4	\$174,105 cost excessive
6. Wildwood	4.0	incompatible land use
7. Oceanville	5.2	\$20,495 cost excessive
8. Long Branch	5.6	\$110,547 cost excessive
9. Keyport	5.6	\$18,799 cost excessive
10. New Brunswick	5.2	\$26,257 cost excessive
11. Arthur Kill	5.6	incompatible land use and \$26,494 cost excessive
12. Jersey City	3.0	incompatible land use
13. Jersey City	5.0	incompatible land use
14. Weehawken	3.0	incompatible land use

---

\* Site names refer to USGS photo quads. Also, eight sites which reverted to wetlands were eliminated from further, more detailed site analysis.

TABLE 3: Suitable Sites (excellent sites comprise less than 1/3 of suitable sites)

<u>Suitability Rating</u>	<u>Site Location*</u>	<u>Composite Rating</u>	<u>Ave. of Non-Cost Factors</u>	<u>Total Annual Cost</u>
Excel.	1. Mays Landing	2.2	1.2	\$ 2,292
	2. New Brunswick	2.4	1.4	\$ 3,978
	3. Palisades Park	2.4	1.4	\$ 2,696
	4. Point Pleasant	2.4	1.4	\$ 2,384
	5. Jersey City	2.6	1.6	0
	6. Jersey City	2.6	1.6	0
Good	7. Frankford	3.2	1.2	\$ 9,707
	8. Marcus Hook	3.2	1.2	\$ 7,488
	9. Cape May	3.2	2.2	\$ 3,274
	10. Point Pleasant	3.2	1.2	\$ 9,464
	11. Jersey City	3.6	1.6	\$ 6,463
	12. Beverly	4.2	1.2	\$11,055
	13. South Amboy	4.2	1.2	\$ 9,104
	14. Philadelphia	4.2	1.2	\$13,596
	15. Penns Grove	4.2	1.2	\$13,409
	16. Ship Bottom	4.2	2.2	\$ 6,940
Fair	17. Camden	4.4	1.4	\$10,382
	18. Long Branch	4.4	1.4	\$14,403
	19. Wilmington S	4.4	1.4	\$11,533
	20. Toms River	4.4	1.4	\$12,560
	21. Atlantic City	4.8	1.8	\$11,822
	22. Asbury Park	4.6	1.6	\$11,033
	23. Pleasantville	4.8	1.8	\$11,569

---

\* Site location names refer to USGS photo quads.

#### 4.0 FINDINGS AND CONCLUSIONS

Of the 37 sampled, undeveloped filled water's edge sites 14 (38%) were found to be unsuitable for marina development and 23 (62%) were found to be potentially suitable (See Tables 2 and 3). The most common liability was exorbitant site improvement costs stemming from either poor water access or remoteness from roads and utilities.

Only 6 of the 23 potentially suitable sites were determined to be "excellent", another 10 were rated "good" and 7 were rated "fair". Potentially suitable sites are widely distributed along New Jersey's waterways (see map which follows). Of the 23 potentially suitable sites (rated excellent, good or fair) 6 are in the South Shore Region, 6 in the North Shore Region, 5 in the southern portion of the Waterfront Region and 6 in the northern portion of the Waterfront Region. Likewise, each of these regions had at least one "excellent" site.

Few sites presented conflicting environmental and development potential concerns. Generally, the rankings resulting from the composite ratings followed the same order as rankings from both environmental factors (shellfisheries, compatibility and wetlands) and development potential factors (tax rates, road access, utilities and water access). In other words, excellent sites are excellent with respect to both environmental and development potential factors.

All but one of the excellent sites can accommodate a large (100 unit) townhouse development in addition to a marina. Even the one exception can accommodate a 25 unit townhouse development with a marina. Of the 23 suitable sites, only one can not accommodate any townhouse development and four can accommodate only 25 units of housing with a marina.

#### 5.0 IMPLICATIONS AND RECOMMENDATIONS

The water's edge inventory (Section 2.2) and the location suitability analysis indicate that suitable marina sites in New Jersey are in short supply; excellent sites are even fewer in number. Consider:

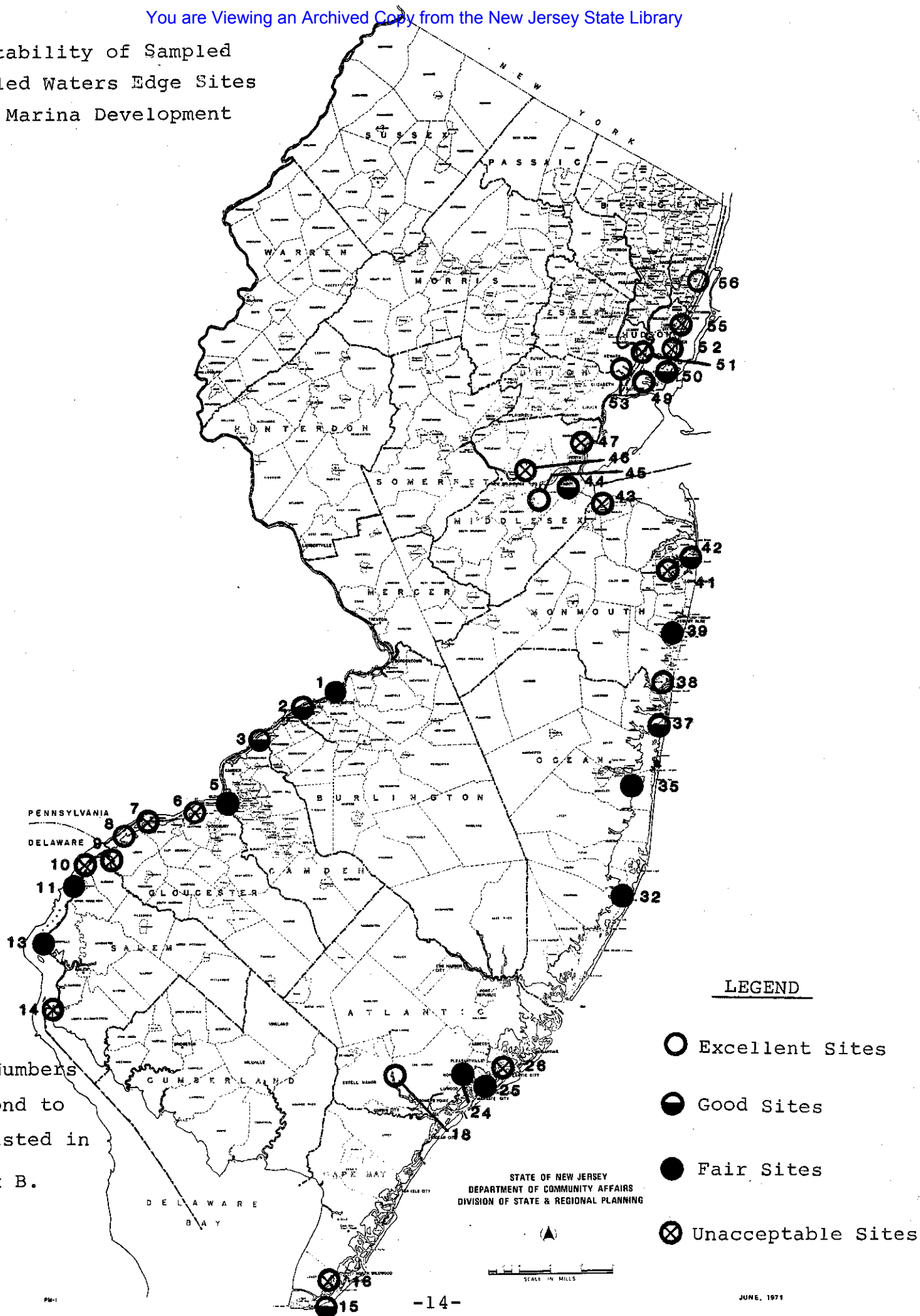
-- Of the State's 753 miles of navigable shoreline, a little over one third (37%) constitutes filled water's edge.

-- Most of the filled water's edge sites (67%) are entirely developed, and thus, unavailable for future marina development.

-- With only roughly 1000' of each undeveloped site being completely free of existing development, a mere 19 miles of the State's 281 miles of filled water's edge (less than 7%) can be considered for marina development (or 19 miles of the State's 753 miles of water's edge -- less than 3%). This estimate excludes wetlands and the natural water's edge which are clearly less desirable for marina or other development.

Furthermore, although a large portion of the undeveloped filled water's edge sites appear suitable for marinas (62%), and even potentially excellent (16%), additional siting considerations and competition from other uses, both water dependent uses and non-water dependent uses, are likely to further reduce the supply of good sites for marina development. Specifically, only 8 of 30 siting considerations (see Table 1) were

# Suitability of Sampled Filled Waters Edge Sites for Marina Development



Note: Numbers correspond to sites listed in Appendix B.

incorporated into the suitability analysis. Some potentially suitable sites would undoubtedly be eliminated when considering other factors such as tidal variation, land ownership and real or perceived security problems.

On the relatively few potentially suitable marina sites, housing development could coexist with a full service marina. This is not necessarily true of existing marina sites as seen in the many marina conversions in which housing either reduced or eliminated space for slips and ancillary facilities.

Given the intent of the New Jersey Coastal Management Program to maintain and enhance existing marinas and other water dependent uses and to reserve undeveloped waterfronts for water dependent uses, where such uses would be viable, it is recommended that:

1. The filled water's edge policy should be made more explicit (see Appendix C) and reinforced to meet the stated policy objectives of reserving the filled water's edge for water dependent uses, preserving the marina industry and ensuring the right of public access to navigable waters.

2. Conversion of marinas to non-water dependent uses should be discouraged where the proposed use would adversely affect an existing marina, whether its continued operation is assured or not.

3. Mixed development that features water dependent uses should be allowed provided that associated non-water dependent development enhances rather than detracts from the water dependent use(s).

REFERENCES AND DATA SOURCES

- Hopkins, Lewis P., "Methods for Generating Land Suitability Maps: a Comparative Evaluation," Journal of the American Institute of Planners, October 1977, pg. 386-400.
- Means, Robert S., Means Construction Guide - Building Construction Cost Data, (Kingston, Massachusetts: Robert Snow Means Company Inc., (1980)).
- National Oceanic and Atmospheric Administration National Ocean Survey Bathymetry Maps, 12345, 12341, 12335, 12333, 12332, 12331, 12324, 12316, 12317, 12304, 12311, 12312, 12314.
- New Jersey Department of Commerce and Economic Development, Division of Travel and Tourism, Your 1980's Marinas and Boat Basins Guide, (Trenton, New Jersey: New Jersey Department of Commerce and Economic Development, (1980)).
- New Jersey Department of Environmental Protection, Division of Coastal Resources. Approved area Charts 1980.
- New Jersey Department of Environmental Protection, Division of Coastal Resources. Coastal Resource and Development Policies, April 19, 1982.
- New Jersey Department of Environmental Protection, Division of Coastal Resources, Developing a Marina in New Jersey: A Handbook prepared by Rogers, Golden & Halpern, (Trenton, New Jersey (1982)).
- New Jersey Department of Environmental Protection, Division of Coastal Resources. New Jersey Environmental Atlas - New Jersey Open Space and Wetlands. Map prepared at 1:250,000. 1975.
- New Jersey Department of Environmental Protection, Division of Coastal Resources. Wetlands Maps - USGS Aerial Photo Quads. Maps prepared at 1:2400, 1977.
- New Jersey Department of Environmental Protection, Office of Environmental Analysis, Tidelands Index, 1979.
- New Jersey Treasury Department, Local Property Taxes, Tax Index and Tax Maps. 1975-1980.
- Rogers, Golden & Halpern, Energy Facility Development Potential Study. (Philadelphia, Pennsylvania, (1981)).
- United States Department of the Agriculture, Soil Conservation Service, County Soil Surveys.

APPENDIX A: Derivation of Cost Threshold

The annualized site improvement cost threshold, that is, the point at which a site is no longer considered economically viable for marina development, was derived as described below.

Rationale

1. Annual revenue from slip rentals and winter storage equals the annual payment on the mortgage (see N.J. Department of Environmental Protection 1982).

2. Annual mortgage payment covers (i.e., equals) the annualized cost of land plus capital improvements.

3. Thus, annual revenue equals the annualized cost of land and capital improvements (i.e., annual mortgage payment).

4. Land plus capital improvements equals fixed capital costs, or base costs (e.g., buildings, slips, parking lot, etc.), plus variable costs, or site improvement costs (e.g., utility extensions, dredging, etc.).

5. Annualized site improvement costs equals annual revenue minus the sum of land and base costs.

Base Marina Cost

<u>Buildings</u>	<u>Sq. Ft.</u>	<u>\$ Sq. Ft.</u>	<u>Cost</u>	<u>Comparable Bldg. Type</u>
Marina Office	28,600	\$28.90	\$ 826,540	Auto Sales
Boat Repair	8,300	29.95	248,585	Garage, Munic.
Locker Room	6,000	39.33	<u>235,980</u>	Gymnasiums
SUBTOTAL			\$1,311,105	

Note: All prices from MEANS Bldg. Const. Cost Data 1981

<u>Equipment and Ancillary Facilities</u>	<u>Cost</u>	<u>Comments</u>
25 - Ton Crane	\$ 30,000	per Marina operators
Wharves	58,500	250 piles x 30' @ \$7.80/ft.
Parking	44,000	32,000 sq. ft.
Fuel Depot	<u>\$ 8,450</u>	
SUBTOTAL		\$140,950

Note: Fuel depot calculated as follows...

gasoline pumps	\$1,750
10,000 gal. tank	5,550
portable booth	95
6"-600 sq. ft. slab	<u>1,056</u>
	\$8,450

### Land

3 acres @ \$36,200/acre = \$108,600

Note: per marina operators surveyed

TOTAL     \$1,311,105 + \$140,950 + \$108,600 = \$1,560,655

Annualized base marina cost = \$1,560,655 x .1023 (capital recovery factor)  
or  
\$159,700

Note: Capital recovery factor =  $\frac{R (1+R)^n}{(1+R)^n - 1}$

where; R = weighted cost of capital (10%)  
n = facility operating life in years (40)

### Marina Revenue

Revenue for a prototypical 100 slip, full service marina was based on annual revenues reported by eight marina operators.

1. Minimum revenue for an economically viable marina established at \$63,000 under the assumption that all but the poorest operating marinas are profitable (i.e., some operating marinas would not be profitable if setting-up today with the prevailing cost of land and venture capital).

2. Assuming all but the poorest marinas recoup their annualized base costs and since the surveyed marinas were not entirely comparable to the prototypical marina, a mortgage adjustment factor was computed as follows:

\$159,700 - 63,000 = \$96,700 (mortgage adjustment factor)

3. The average reported annual revenue was \$78,200, thus, the total annual revenue for the prototypical marina was computed as \$78,200 + 96,700 = \$174,900.

Cost Threshold

Having calculated the total annual revenue and the annualized base costs, the cost threshold, that is, the maximum annual cost for a 100 slip, full service marina to be considered economically viable, is derived by subtracting the two values.

$$\$174,900 - 159,700 = \$15,200$$

APPENDIX B: Site Suitability Rating

Non-Cost Factors

Cost-Evaluated Factors

	Non-Cost Factors					Cost-Evaluated Factors					Composite Rating		
	I	II	III	IV	V	Average	VI	VII	VIII	IX		Total Costs	Cost Rating
1. Beverly	1	1	1	2	1	1.2	0	\$6,375	\$4,680	0	\$11,055	3	4.2
2. Frankford	1	1	1	2	1	1.2	0	5,597	4,110	0	9,707	2	3.2
3. Camden	1	1	1	3	1	1.4	0	5,987	4,395	0	10,382	3	4.4
4. Philadelphia	NO DATA												
5. Philadelphia	1	1	1	2	1	1.2	0	3,265	6,393	3,938	13,596	3	4.2
6. Woodbury	1	1	1	2	1	1.2	0	12,984	9,533	6,758	29,275	4	5.2
7. Bridgeport	1	1	1	1	1	1.0	0	17,260	32,081	4,366	53,707	4	5.0
8. Marcus Hook	1	1	1	2	1	1.2	0	0	0	7,488	7,488	2	3.2
9. Marcus Hook	1	1	1	2	1	1.2	\$1,252	2,488	13,700	8,286	25,726	4	5.2
10. Marcus Hook	1	1	1	2	3	1.6	0	1,322	24,660	10,741	36,723	4	5.6
11. Penns Grove	1	1	1	2	1	1.2	0	5,209	3,825	4,375	13,409	3	4.2
12. Wilmington Sth.			4										
13. Wilmington Sth.	1	1	1	3	1	1.4	0	2,488	1,827	7,218	11,533	3	4.4
14. Taylors Bridge	1	1	1	1	3	1.4	1,252	99,673	73,180	0	174,105	4	5.4
15. Cape May	3	1	2	2	3	2.2	1,252	1,166	856	0	3,274	1	3.2
16. Wildwood	1	3	2	2	2	2.0	0	0	0	7,339	7,339	2	4
17. Avalon					4								
18. Mays Landing	1	2	1	1	1	1.2	0	1,322	970	0	2,292	1	2.2
19. Marmara			4										
20. Marmara				4									
21. Ocean City				4									
22. Ocean City				4									
23. Ocean City			4										
24. Pleasantville	1	1	1	3	3	1.8	1,252	3,265	2,398	4,654	11,569	3	4.8
25. Atlantic City	1	1	1	1	3	1.4	1,252	777	608	9,185	11,822	3	4.4
26. Oceanville	1	1	1	2	1	1.2	0	11,818	8,677	0	20,495	4	5.2
27. Oceanville					4								
28. Tuckerton				4									
29. Tuckerton			4										
30. Beach Haven			4										
31. Tuckerton				4									
32. Ship Bottom	2	2	3	1	3	2.2	0	0	1,541	5,399	6,940	2	4.2
33. Forked River			4										
34. Toms River				4									
35. Toms River	1	2	2	2	1	1.6	0	0	0	12,560	12,560	3	4.6
36. Pt. Pleasant			4										
37. Pt. Pleasant	1	1	1	2	1	1.2	0	0	0	9,464	9,464	2	3.2
38. Pt. Pleasant	1	1	2	2	1	1.4	0	0	0	2,384	2,384	1	2.4

39.	Asbury Park	1	1	1	4	1	1.6	0	0	0	11,033	11,033	3	4.6
40.	Asbury Park	1	1	4	3	1	1.6	0	0	0	110,547	110,547	4	5.6
41.	Long Branch	1	1	2	3	1	1.4	0	3,265	0	8,740	14,403	3	4.4
42.	Long Branch	1	1	1	3	1	1.6	0	1,322	970	16,507	18,799	4	5.6
43.	Keyport	1	1	2	3	1	1.2	0	1,710	1,256	6,138	9,104	3	4.2
44.	South Amboy	1	1	1	3	1	1.2	0	2,294	1,684	0	3,978	1	2.2
45.	New Brunswick	1	1	1	2	1	1.2	0	12,595	9,248	4,414	26,257	4	5.2
46.	New Brunswick	1	1	1	2	1	1.2	0	15,277	11,217	0	26,494	4	5.6
47.	Arthur Kill	1	3	1	2	1	1.6	0	0	0	0	0	1	2.6
48.	Elizabeth	1	1	4	4	1	1.6	0	0	0	0	0	1	3.6
49.	Jersey City	1	1	1	4	1	1.6	0	0	0	6,463	6,463	2	3
50.	Jersey City	1	1	1	4	1	2.0	0	0	0	3,580	3,580	1	5
51.	Jersey City	1	3	1	4	1	2.0	0	7,775	5,708	0	13,483	3	2.6
52.	Jersey City	1	3	1	4	1	2.0	0	0	0	0	0	1	3.0
53.	Jersey City	1	1	1	4	1	1.6	0	0	0	0	0	1	2.4
54.	Jersey City	1	1	4	4	1	2.0	0	0	0	0	0	1	
55.	Weehawken	1	3	1	4	1	1.4	0	1,555	1,142	0	2,696	1	
56.	Palisades Park	1	2	1	2	1		0					1	
57.	Atlantic City			4										

Note: Numbers from 1-57 in left margin correspond to map depicting site suitability for the sampled sites.

KEY

Non-Cost Factors

- I. Shellfisheries
- II. Computability
- III. Undev. Land
- IV. Tax Rate
- V. Wetlands

Cost-Evaluated Factors

- VI. Wetland Reclamation
- VII. Road Access
- VIII. Utilities
- IX. Dredging

APPENDIX C:

Recommended Policy Revisions  
June 1983

The following recommended policy changes and guidelines are intended to produce consistent decisions which, at the same time, reflect the full array of factors that make each project unique. The purpose of each recommended policy revision is stated along with changes and additions to definitions and rationales, where necessary.

Water Dependent Uses (7:7E-1.6(c))

- (8) "water dependent uses" means development that [must have] can not physically function without direct access to the water body along which it is proposed [in order to function]. Uses, or portions of uses, that can function on inland sites are not considered water dependent regardless of the economic advantages that may be gained from a waterfront location.

Purpose: Economic viability is often cited as the reason a particular use is water dependent. At the same time, the distinction between economic viability (sustenance) and economic advantage (added profit) is, for all practical purposes, impossible to make. Thus, removing economic considerations from the definition, and basing it instead on functional considerations, will clarify the definition of water dependent uses.

Water Dependent Uses Guidelines

Water dependent uses include:

- marinas
- marina storage area where many of the boats being stored are too large to feasibly transport to inland sites.
- port activities requiring the frequent loading and unloading of ships.
- industries such as fish processing and aquaculture.
- water-oriented recreation.

Water Dependent uses exclude, for example:

- housing
- hotels
- motels
- casinos
- restaurants
- warehouses and manufacturing facilities, except those

receiving or distributing large volumes of supplies or goods by ship.

- automobile junkyards
- long-term parking and parking for people not participating in a water dependent use.
- non-water oriented recreation such as roller rinks and racquet ball courts unless they are part of a larger water-related mixed use development.

#### Waterfront Portion of a Site

The waterfront portion of the filled water's edge is not defined in the latest edition of the Coastal Resource and Development Policies. The definition which follows may be most appropriately placed following the definition of Filled Water's Edge, immediately preceding the policy.

All land within 100 feet of a navigable waterway excluding all designated wetlands and wetlands buffer, or an equivalent area. An equivalent area must be water-oriented, having at least 30% of its perimeter adjacent to the waterway.

Purpose: A more workable filled water's edge policy requires a more explicit definition of this term. The recommended definition, while more explicit, provides the latitude to designate linear or rectangular parcels for water dependent uses.

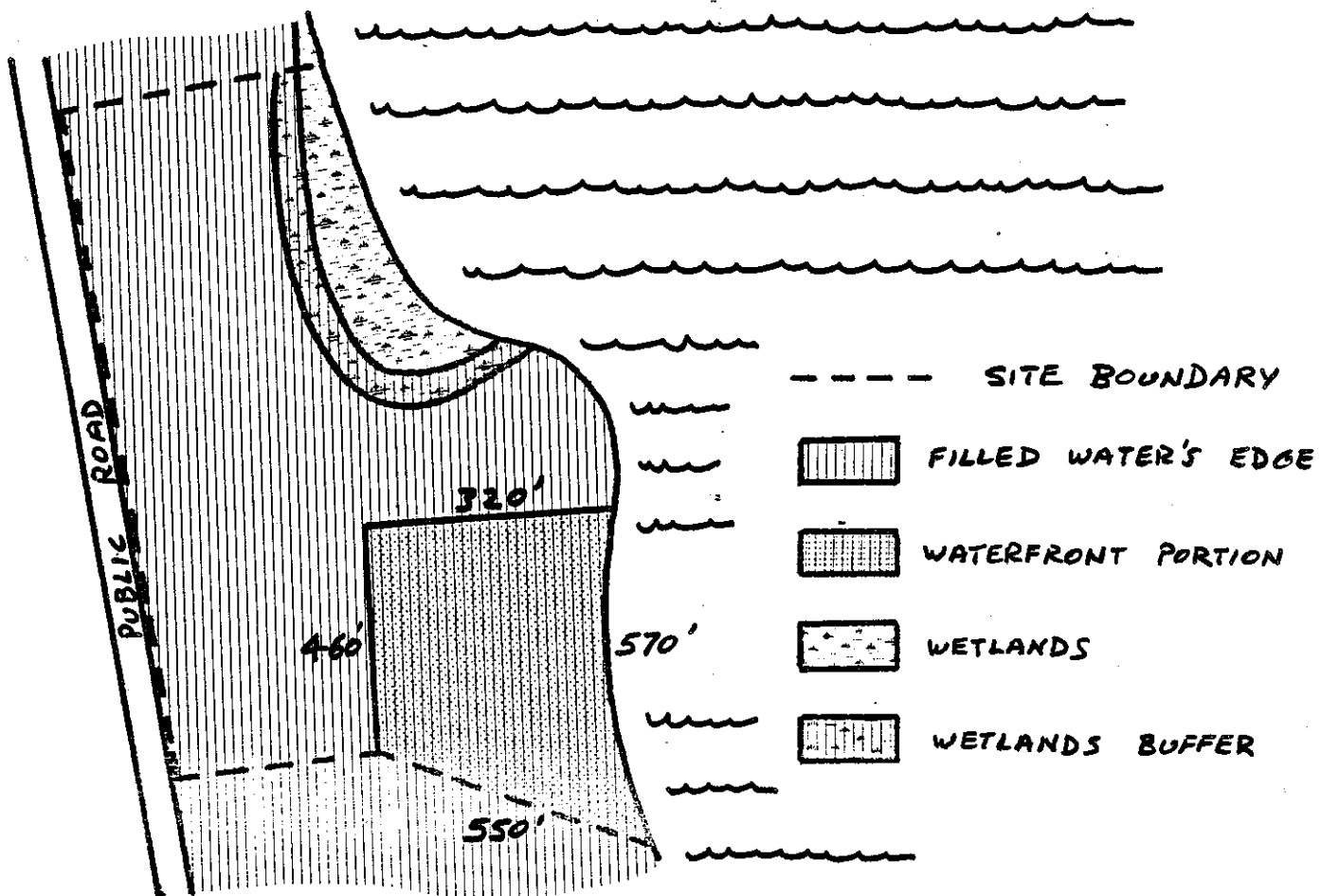
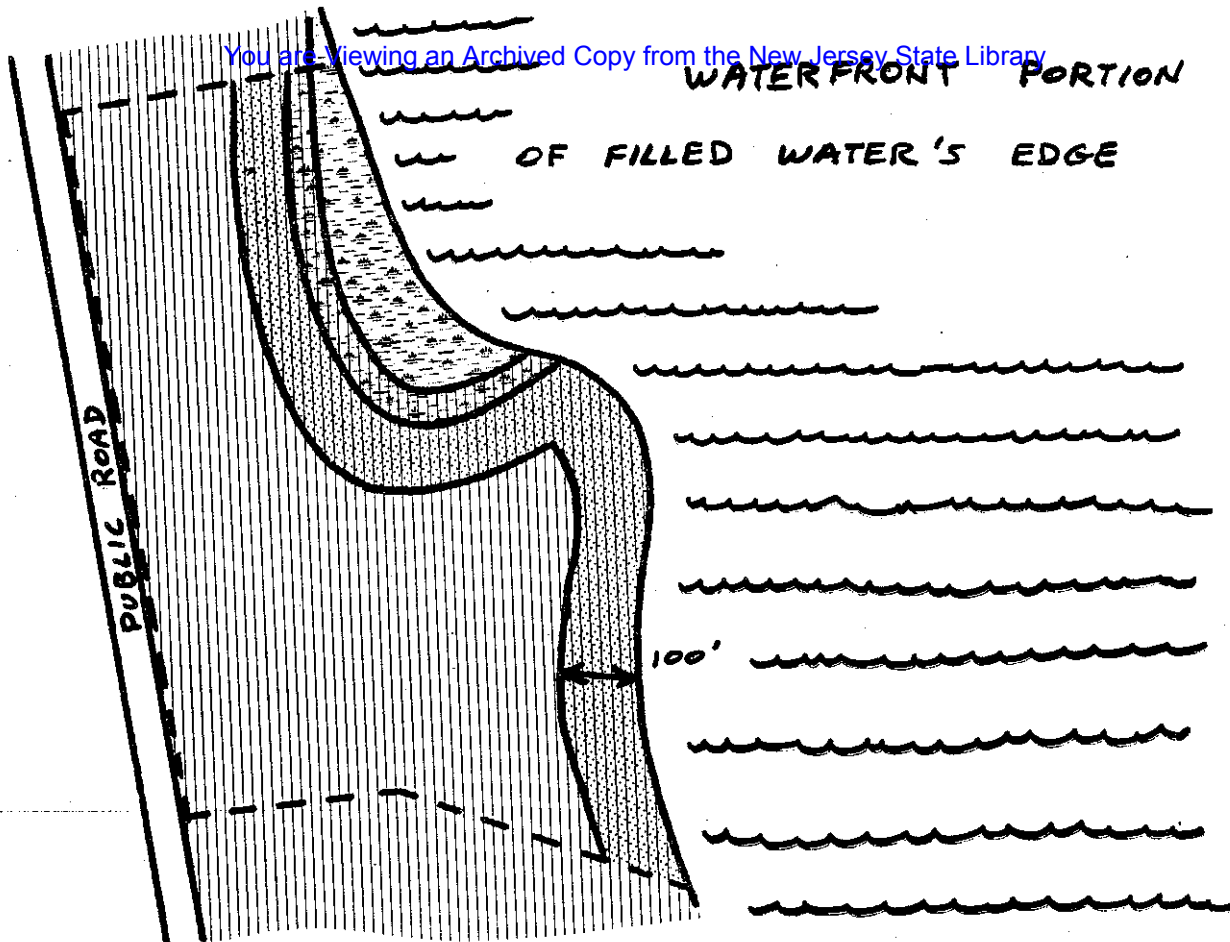
#### Marina Mooring Policy (7:7E-3.10)

1. Any use that would result in a decrease in the water area devoted to slips open to the general public or otherwise detract from existing or proposed recreational boating use in marina mooring areas is discouraged.

#### Rationale (Marina Mooring Policy)

...recreation service they provide is, therefore, a high priority. The need to retain slips open to the public is apparent in the fact that 70% of New Jersey's marinas are full, many with waiting lists (N.J. DEP, 1982). Further, preserving slips open to the general public assures that areas presently or formerly State owned, that is, tidelands will continue to satisfy provisions of the Public Trust Doctrine.

Purpose: Since loss of marina slips open to the general public is the predominant concern, specifying it in the policy and rationale provides added clarity.



### Marina Mooring Guidelines

Open to the general public is defined as any arrangement which allows the average recreational boater in New Jersey reasonable access to the facility. The following arrangements would not qualify as reasonably open to the general public:

- slips leased only to owners of associated housing,
- slips leased only to members of a club, unless any members of the general public could join simply by paying a reasonable fee,
- slips devoted entirely to the "boating elite", that is, accommodating only boats exceeding 26 feet in length.

It may be appropriate to incorporate the definition of "open to the general public" in the Marina Mooring policy or rationale.

### Filled Water's Edge Policy (7:7E-3.17)

- (1) Water dependent uses (see section 7:7E-1.6(c) for definition) [uses] are encouraged [acceptable] in the Filled Water's Edge provided they would not prevent public access either to the water's edge or along the water's edge.
- (2) Non-water dependent development in the waterfront portion of the Filled Water's Edge is prohibited.
- (3) Non-water dependent development elsewhere in the Filled Water's Edge is conditionally acceptable provided (a) it would not adversely affect existing water dependent uses, (b) it would not preempt use of the waterfront portion of the Filled Water's Edge for potential water dependent uses, and (c) it would not prevent public access either to the water's edge or along the water's edge.

Purpose: Provision (1), as revised, provides a stronger endorsement of water-dependent development which seems warranted given the relative scarcity of filled water's edge sites with potential for water-dependent development. Only about 4% of the State's 281 miles of filled water's edge is potentially suitable for marinas.

Provision (2) is new. Its prohibition of non-water dependent development on the above defined "waterfront portion" seems warranted for two reasons. First, accommodating water-dependent uses requires restricting the

competing non-water dependent uses from the remaining undeveloped filled water's edge sites. Second, development of non-water dependent uses in the waterfront portion of a site would rarely preclude development of non-water dependent uses (on the uplands). However, the converse would frequently preclude water dependent uses from filled water's edge sites.

Also, consider the recently approved marina conversions. Under this recommended policy, they all would still have been approved though the intensity of non-water dependent development along the water's edge would have been reduced. Thus, this policy would compliment rather than compromise other policies such as the wetlands buffer, runoff and water quality policies.

Provision (3), part (a) protects existing marinas which are not addressed by the present policy. Provision (3), part (c) has been modified to assure access to the water's edge as well as along the water's edge. Thus, more people could enjoy waterfront walkways, fishing piers, marinas, etc.

#### Rationale (Filled Water's Edge Policy)

...Because the waterfront is a scarce resource, it is desirable to limit waterfront development in these areas to uses that are water dependent unless because of their location, they do not have the potential to attract water dependent uses. Only 37% of the State's 753 miles of shoreline along navigable waterways is filled water's edge, and a much smaller 3% is undeveloped filled water's edge (N.J. DEP, 1983).

In particular, marinas are encouraged since they benefit the State by attracting tourists and associated revenues and by providing recreational opportunities to the estimated 25% of residents that go boating in bays and coastal waters of the State (1977 Eagleton Institute Poll). Further, existing marinas are inadequate to serve current and projected demand. The vast majority of existing marinas (70%) are filled to capacity with many having waiting lists, evidence of a large unmet demand (N.J. DEP, 1982). According to the New Jersey State Comprehensive Outdoor Recreation Plan (SCORP), boating demand will increase through 1995 leaving even more New Jersey boaters without boating facilities and perhaps diverting large numbers to other states.

### Filled Water's Edge Policy Guidelines

Provisions (1) and (2) are self explanatory. The following guidelines apply to provision (3) of the filled water's edge policy.

(a) Adverse affect -- development which would adversely affect the operation of an existing water dependent use should be prohibited. Adverse affects may arise from any one of the following:

1. Access-reduced pedestrian (if applicable), vehicular or water vessel access to the operating water dependent use or components thereof.
2. Incompatibility-obtrusive sights, sounds or smells regularly emanating from the proposed development that would clearly detract from the established setting (e.g., heavy industrial uses).
3. Encroachment-reduced area for water dependent uses or necessary ancillary facilities (e.g., parking, storage, maintenance facilities, etc.)

For operating marinas that are not presently full service marinas it would be desirable to enable future expansion of the marina by retaining some adjacent open space.

(b) Preempt potential water dependent uses -- non-water dependent development which would preclude or inhibit the development or operation of a future water dependent use on the waterfront portion of a site should be prohibited. These include uses which would create access problems, be obtrusive, or occupy filled water's edge that would be needed for the potential water dependent use.

The potential for water dependent uses shall be determined on the basis of the following criteria, among other site-specific criteria that are deemed relevant:

- site accessible by paved road.
- water depth at water's edge (i.e., within 50 feet of Mean High Water Level) 3 feet Mean Low Water Level (MLW) or greater, or the potential of this depth with limited new dredging.
- continuous 3 foot MLW depth to existing, navigable channel or open water with 3 foot depth.
- adjacent land uses compatible with proposed water-dependent use, if any. If none proposed, adjacent uses must be compatible with passive

recreational uses (see part (a), item 2 of guidelines for factors to consider for compatibility).

--absence of commercially harvestable shellfishery in water area that would require dredging, if any.

--public utilities, water, sewer and electric, available to site.

Where site characteristics make a water dependent use less desirable or infeasible, the amount of filled water's edge to be retained should be reduced or eliminated. Factors which may justify retaining less filled water's edge for water dependent use include the following:

1. Hazardous conditions either on site or adjacent such as toxic substances processing or storage, contaminated soils, heavy machinery in use, etc.
2. Waterway at filled water's edge unnavigable for either commercial or recreational vessels, for example, where a wetlands (i.e., more than merely wetlands fringe), critical wildlife habitat or other environmentally sensitive area separates the filled water's edge from a waterway. Or, where a productive shellfish bed is located immediately offshore.

Note, economic factors do not provide a basis for retaining less filled water's edge for water dependent uses.

(c) Public access -- consult public access guidelines.

DS/js