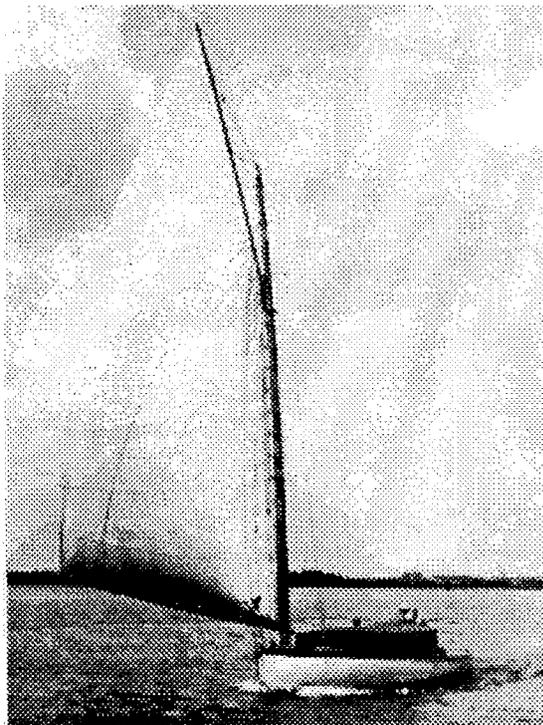


# **A WATERSHED MANAGEMENT PLAN FOR BARNEGAT BAY**

## **Volume 2: Appendices**

**A Report of the  
New Jersey Department of Environmental Protection and Energy  
to the New Jersey Legislature,  
Ocean County Board of Chosen Freeholders,  
Bay Area Municipalities  
and the People of Ocean County**

**June 1993**



**Jim Florio, Governor  
State of New Jersey**

**Scott Weiner, Commissioner  
New Jersey  
Department of Environmental Protection and Energy**



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New Jersey Department of Environmental Protection and Energy  
and by the  
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under the provisions of Section 305 of the  
Federal Coastal Zone Management Act P.L. 92-583, as amended.

Cover Photo: Barnegat Bay Catboat "Vim". Built in 1900 by Morton Johnson of Bay Head, NJ and still used to sail the Bay.

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APPENDIX 1  
ENABLING LEGISLATION

3. This act shall take effect immediately.

Approved January 13, 1988.

### CHAPTER 397

AN ACT concerning the study of development in and around Barnegat bay, creating the Barnegat Bay Study Group, and making an appropriation.

BE IT ENACTED by the Senate and General Assembly of the State of New Jersey:

1. The Legislature finds that Barnegat bay in Ocean county is a valuable natural resource providing innumerable recreational, economic, and aesthetic benefits important to the welfare of the citizens of the State; that the conferral of these benefits is strongly dependent upon the water quality of Barnegat bay and the general vitality of the Barnegat bay ecosystem; and that the Barnegat bay area is currently experiencing intense development pressure which is adversely affecting its water quality and ecology.

The Legislature therefore declares that it is appropriate to conduct a study of the nature and extent of the impact of this development upon this valuable natural resource, to create the Barnegat Bay Study Group to supervise this study, and to develop an appropriate land use and environmental management plan for consideration by all levels of government.

2. As used in this act:

“Barnegat bay” means Barnegat bay, Silver bay, Manahawkin bay (North of State Route 72) and the tributaries thereof, including, but not limited to, Kettle creek, Metedeconk river, Toms river, Cedar creek, Forked river, and Gunning river;

“Bay area” means that area of Ocean county comprising Barnegat bay and all lands within the bay area municipalities located between Barnegat bay and the first public road of the bay area municipality.

“Bay area municipalities” means the Ocean county townships of Berkeley, Brick, Stafford, Barnegat, Ocean, Lacey, Long Beach, and Dover and the Ocean county boroughs of Bay Head, Lavallet Mantoloking, Point Pleasant, Point Pleasant Beach, Sea

Heights, Island Heights, South Toms River, Beachwood, Pine Beach, Ocean Gate, Barnegat Light, Harvey Cedars, Surf City, Ship Bottom, and Seaside Park;

“Consultant” means the person selected by the Barnegat Bay Study Group to conduct the study described pursuant to section 5 of this act;

“Department” means the Department of Environmental Protection;

“Plan” means the comprehensive land use and environmental management plan for the bay area prepared pursuant to subsection c. of section 6 of this act; and

“Study group” means the Barnegat Bay Study Group created pursuant to section 3 of this act.

3. a. There is created the Barnegat Bay Study Group, which shall be comprised of: the Commissioner of the Department of Environmental Protection, or his designee, who shall serve as chairman; a representative selected by the governing body of Ocean county; and four representatives from the bay area municipalities, to be elected at a meeting convened by and among the chief executive officers of the bay area municipalities as soon as may be practicable after the effective date of this act; two of whom shall be from the 9th legislative district, and two of whom shall be from the 10th legislative district.

b. Vacancies in the appointed positions on the study group shall be filled in the same manner as the original appointments were made.

c. Members of the study group shall serve without compensation, but the study group may, within the limits of funds appropriated or otherwise made available to it, reimburse members for actual expenses necessarily incurred in the discharge of their official duties.

d. The study group shall organize as soon as may be practicable after the appointment of its members and shall select a vice-chairman from among its members and a secretary who need not be a member. The study group may, within the limits of any funds appropriated or otherwise made available to it, appoint such staff or hire such experts as it may require.

e. The study group shall meet regularly as it may determine, and shall also meet at the call of the chairman or the Governor.

4. It shall be the duty of the study group to:

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## CHAPTER 397, LAWS OF 1987

- a. supervise the preparation of the environmental inventory and the options paper which shall be developed by a consultant selected therefor pursuant to subsection c. of this section;
- b. review, and comment upon, the scope of services required of the consultant by the department;
- c. select the consultant from a list of applicants provided by the department;
- d. review, and comment upon, the periodic reports and all draft and final reports which shall be submitted by the consultant;
- e. confer with public interest organizations, trade associations, and similar groups which are interested in the results of the study or which represent persons that may be affected by any action taken by government based upon the results thereof; and
- f. review, and comment upon, the proposed plan prepared by the department pursuant to subsection c. of section 6 of this act.

The study group shall dissolve upon transmittal of the plan prepared by the department to the Legislature.

5. The study of the bay area conducted by the consultant shall:

- a. Develop an environmental inventory assessment of the Barnegat bay area which includes:
  - (1) A literature search on non-point pollution sources and their impact on estuarine environments, particularly in urban and suburban areas.
  - (2) An assessment of available data on current conditions and trends regarding:
    - (a) water quality in Barnegat bay and tributaries;
    - (b) qualitative and quantitative aspects of marine and estuarine shellfish, fish, and wildlife resources;
    - (c) environmentally sensitive areas and open space;
    - (d) hydrographic and navigability description of Barnegat bay;
    - (e) bay area municipality growth patterns over the previous 10 years;
    - (f) impervious paving coverage trends over the previous 10 years in bay area municipalities;

- (g) current and projected land uses and land use patterns in bay area municipalities;

- (h) an inventory and assessment of existing ordinances, policies and regulations available for utilization in the balancing of reasonable development with preservation and enhancement of the natural, aesthetic and recreational values of the bay area.

- b. Develop an options paper utilizing the environmental inventory assessment which will:

- (1) Assess whether land development in the bay area has reached such a level that further growth could not be accommodated without a significant effect upon the water quality of Barnegat bay or the general vitality of the bay area ecosystem, and, if that level has not yet been reached, determine the extent to which further growth can be so accommodated;

- (2) Assess the navigability of Barnegat bay and make recommendations as to how it may be improved;

- (3) Assess whether boat traffic on Barnegat bay has reached such a level that additional traffic could not be accommodated without a significant effect upon the water quality of Barnegat bay or the general vitality of the bay area ecosystem, or threat to the public health and safety, and, if that level has not yet been reached, determine the extent to which additional traffic can be so accommodated; and

- (4) Develop appropriate standards and controls and institutional alternatives to be considered for adoption and application by all levels of government in those circumstances, if any, where additional growth may be permitted in the bay area.

6. It shall be the duty of the department to:

- a. determine, after consulting with the study group, the scope of services which shall be required of the consultant;

- b. solicit applicants for the position of consultant and compose a list thereof for consideration by the study group pursuant to subsection c. of section 4 of this act;

- c. prepare a comprehensive land use and environmental management plan for the bay area based upon the study and the comments of the study group, which plan shall address the concerns about the impact of further development in the bay area and include rec-

ommendations for appropriate action by the Legislature, the department, other State agencies, Ocean county, and bay area municipalities;

d. submit the proposed plan to Ocean county and to bay area municipalities for review and comment; and

e. transmit the plan, within one year of the effective date of this act, together with any comments thereon provided by Ocean county and by bay area municipalities, to the Legislature on a day during which the Houses are both meeting during the course of a regular or special session, to Ocean county, and to bay area municipalities for their respective consideration.

7. Upon transmittal of the plan, the governing body of Ocean county and the governing body of each bay area municipality may determine whether the plan or any portion thereof should be implemented to minimize adverse impacts of development within its jurisdiction, and may adopt such ordinances or resolutions, as appropriate, as may be necessary to so effectuate its purposes.

8. a. The department shall apply a minimum of at least \$20,000.00 in grant moneys made available to it pursuant to the federal "Coastal Zone Management Act of 1972," as amended and supplemented (16 U.S.C. §1451 et seq.), to carry out the purposes of this act.

b. There is appropriated from the General Fund to the Department of Environmental Protection the sum of \$180,000.00 to carry out its responsibilities under this act.

9. This act shall take effect immediately.

Approved January 13, 1988.

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#### CHAPTER 398

AN ACT concerning the establishment of State-operated school districts, amending and supplementing P.L. 1975, c. 212 and amending P.L. 1979, c. 294.

BE IT ENACTED by the Senate and General Assembly of the State of New Jersey:

APPENDIX 2

PROFILE OF BARNEGAT BAY  
(on file at NJDEPE)

APPENDIX 3

MANAGEMENT RECOMMENDATIONS FOR BARNEGAT BAY  
(on file at NJDEPE)

APPENDIX 4

DEVELOPMENT RELATED POLLUTANT LOADINGS

## POPULATION ESTIMATES AND ASSOCIATED HOUSING REQUIREMENTS

Municipality	Estimated 1972 Population	People/ Household	#Dwelling Units Needed
Barnegat	2070	2.6	796.15
Barnegat Light	615	2.6	236.54
Bay Head	1090	2.6	419.23
Beachwood	4780	2.6	1838.46
Berkeley	10485	2.6	4032.69
Brick	39095	2.6	15036.54
Dover	47765	2.6	18371.15
Harvey Cedars	450	2.6	173.08
Island Heights	1425	2.6	548.08
Jackson	19590	2.6	7534.62
Lacey	6380	2.6	2453.85
Lakehurst	2900	2.6	1115.38
Lakewood	30020	2.6	11546.15
Lavalette	1540	2.6	592.31
Long Beach	3460	2.6	1330.77
Manchester	10040	2.6	3861.54
Mantoloking	320	2.6	123.08
Ocean	2330	2.6	896.15
Ocean Gate	1100	2.6	423.08
Pine Beach	1440	2.6	553.85
Plumsted	4355	2.6	1675.00
Point Pleasant	16640	2.6	6400.00
Point Pleasant Beach	4865	2.6	1871.15
Seaside Heights	1375	2.6	528.85
Seaside Park	1460	2.6	561.54
Ship Bottom	1205	2.6	463.46
South Toms River	4130	2.6	1588.46
Stafford	4130	2.6	1588.46
Surf City	1210	2.6	465.38
Total	226265		87025

Source: Ocean County Planning Board

**POPULATION ESTIMATES AND ASSOCIATED HOUSING REQUIREMENTS**

<b>Municipality</b>	<b>Estimated 1986 Population</b>	<b>People/ Household</b>	<b>#Dwelling Units Needed</b>
Barnegat	10576	2.6	4067.69
Barnegat Light	746	2.6	286.92
Bay Head	1381	2.6	531.15
Beachwood	8657	2.6	3329.62
Berkeley	35278	2.6	13568.46
Brick	65077	2.6	25029.62
Dover	74688	2.6	28726.15
Harvey Cedars	391	2.6	150.38
Island Heights	1676	2.6	644.62
Jackson	31585	2.6	12148.08
Lacey	19762	2.6	7600.77
Lakehurst	2923	2.6	1124.23
Lakewood	41043	2.6	15785.77
Lavalette	2238	2.6	860.77
Long Beach	3831	2.6	1473.46
Manchester	33773	2.6	12989.62
Mantoloking	452	2.6	173.85
Ocean	4325	2.6	1663.46
Ocean Gate	1523	2.6	585.77
Pine Beach	1850	2.6	711.54
Plumsted	5333	2.6	2051.15
Point Pleasant	19254	2.6	7405.38
Point Pleasant Beach	5678	2.6	2183.85
Seaside Heights	2003	2.6	770.38
Seaside Park	2021	2.6	777.31
Ship Bottom	1814	2.6	697.69
South Toms River	3975	2.6	1528.85
Stafford	13162	2.6	5062.31
Surf City	1649	2.6	634.23
<b>Total</b>	<b>396664</b>		<b>152563</b>

Source: Ocean County Planning Board

## POPULATION AND ASSOCIATED HOUSING REQUIREMENTS

Municipality	1990 Population	People/ Household	#Dwelling Units Needed
Barnegat	12235	2.94	4163
Barnegat Light	675	2.05	330
Bay Head	1226	2.31	530
Beachwood	9324	3.06	3047
Berkeley	37319	2.12	17614
Brick	66473	2.66	24965
Dover	76371	2.79	27357
Harvey Cedars	362	2.06	176
Island Heights	1470	2.64	557
Jackson	33233	2.99	11116
Lacey	22141	2.78	7957
Lakehurst	3078	3.04	1013
Lakewood	45048	2.75	16352
Lavalette	2299	2.15	1070
Long Beach	3407	2.05	1661
Manchester	35976	1.94	18512
Mantoloking	334	2.01	166
Ocean	5416	2.60	2087
Ocean Gate	2078	2.49	834
Pine Beach	1954	2.64	740
Plumsted	6005	2.87	2089
Point Pleasant	18177	2.59	7008
Point Pleasant Beach	5112	2.47	2068
Seaside Heights	2366	2.33	1015
Seaside Park	1871	2.28	820
Ship Bottom	1352	2.08	649
South Toms River	3869	3.61	1073
Stafford	13325	2.61	5115
Surf City	1375	2.08	661
Total	413871		160745

Source: Rutgers University Center for Urban Policy Research

## POPULATION PROJECTIONS AND ASSOCIATED HOUSING REQUIREMENTS

Municipality	Projected 1995 Population	People/ Household	#Dwelling Units Needed
Barnegat	12926	2.86	4520
Barnegat Light	705	1.98	356
Bay Head	1271	2.27	561
Beachwood	10154	3.04	3342
Berkeley	41875	2.09	20063
Brick	71913	2.61	27527
Dover	82178	2.75	29883
Harvey Cedars	376	2.00	188
Island Heights	1511	2.58	585
Jackson	35857	2.93	12246
Lacey	24855	2.76	8993
Lakehurst	3200	2.98	1073
Lakewood	48546	2.73	17776
Lavalette	2449	2.11	1161
Long Beach	3544	2.00	1769
Manchester	40379	1.92	21030
Mantoloking	343	1.95	176
Ocean	5940	2.58	2302
Ocean Gate	2250	2.46	916
Pine Beach	2067	2.61	792
Plumsted	6376	2.83	2252
Point Pleasant	18850	2.54	7413
Point Pleasant Beach	5251	2.42	2172
Seaside Heights	2560	2.30	1111
Seaside Park	1967	2.25	876
Ship Bottom	1416	2.03	698
South Toms River	3938	3.54	1112
Stafford	14842	2.58	5754
Surf City	1436	2.03	709
Total	----- 448975		----- 177356

Source: Rutgers University Center for Urban Policy Research

## POPULATION PROJECTIONS AND ASSOCIATED HOUSING REQUIREMENTS

Municipality	Projected 2010 Population	People/ Household	#Dwelling Units Needed
Barnegat	15000	2.71	5526
Barnegat Light	780	1.82	429
Bay Head	1376	2.15	641
Beachwood	12508	2.99	4179
Berkeley	55181	2.02	27283
Brick	87175	2.50	34836
Dover	98314	2.66	36988
Harvey Cedars	409	1.85	221
Island Heights	1598	2.45	653
Jackson	43186	2.79	15468
Lacey	32782	2.73	12029
Lakehurst	3497	2.85	1227
Lakewood	58295	2.68	21750
Lavalette	2858	2.02	1415
Long Beach	3878	1.89	2054
Manchester	53239	1.87	28439
Mantoloking	362	1.78	203
Ocean	7439	2.55	2914
Ocean Gate	2733	2.38	1148
Pine Beach	2369	2.54	932
Plumsted	7373	2.73	2700
Point Pleasant	20453	2.42	8453
Point Pleasant Beach	5545	2.28	2430
Seaside Heights	3103	2.25	1380
Seaside Park	2218	2.16	1027
Ship Bottom	1579	1.90	830
South Toms River	4045	3.37	1199
Stafford	19248	2.53	7620
Surf City	1589	1.89	841
Total	548132		224815

Source: Rutgers University Center for Urban Policy Research

## **An Analysis of Pollutant Loadings over Time for each Municipality in the Barnegat Bay Watershed**

### Methodology:

An analysis was conducted to assess pollutant loadings from each municipality in the Barnegat Bay Study Area. Estimates of pollutant loadings were determined by using land use data from the Geographical Information System (GIS) and pollutant loading factors from research done by T.R. Schueler. In order to accurately determine pollutant loadings to the Barnegat Bay, extensive water quality monitoring would have to be performed and the layout of the stormwater sewer system would have to be known in developed areas. This information would allow a researcher to establish the amount of pollutants that are being discharged into the Bay by examining land use activities and drainage patterns.

Unfortunately, the necessary data to conduct such an analysis is not available at this time. Therefore, a simplified method was used to estimate pollutant loadings for this study. The method used here is the same method that was utilized by Rogers, Golden and Halpern (RGH) in the Profile of the Barnegat Bay. In the Profile, RGH compared pollutant loadings from two watersheds, one that was highly developed and one in early developing stages. RGH calculated the percent impervious coverage for different land use categories. The acres of each land use category was multiplied by this percent impervious coverage number. The resulting figure was then multiplied by pollutant loading factors provided by T.R. Schueler.

For the current analysis, a comparison was conducted using information on 1972 land use patterns, 1986 land use patterns and zoning data. When determining the percent of impervious coverage for 1986 land use, information that was collected by Cahill Associates for the report Limiting Nonpoint Source Pollution From Development in the New Jersey Coastal Zone was utilized. Cahill Associates' data provides a more accurate number for percent impervious coverage of certain land uses. This may explain why, in fully developed communities, pollutant loadings calculated on zoning are less than pollutant loadings for 1986 land use. In addition, the analysis that was conducted here will be expanded in the future to include the methodology developed by Cahill Associates in their report.

### Results:

It should be noted that this study was conducted within the Barnegat Bay Study Area, and therefore, the municipalities which are not totally within the study area will not have pollutant loadings for their entire geographical boundaries. Between 1972 and 1986 pollutant loadings from municipalities in the Barnegat Bay Study Area increased by over 50%. Furthermore, projections show that pollutant loadings will increase over 40% if municipalities are fully developed. Many of the smaller municipalities were almost completely developed by 1986. These municipalities must now focus on nonpoint source educational programs and incorporating structural stormwater pollutant controls for any redevelopment that takes place. For municipalities with land available for development in 1986, graphs were created to show the increase in pollutant loadings if full development, according to zoning, is

realized. Also, additional maps were plotted for these municipalities displaying the municipal zoning for this developable land. By examining both the graphs and the maps, these municipalities will be able to visualize the impacts of future development on the Barnegat Bay. Again, these municipalities must focus on formulating strong educational programs for controlling nonpoint source pollution. However, where there is land available for development, additional measures may be taken such as structural stormwater controls and alterations to land development patterns.

#### REFERENCES:

CAHILL ASSOCIATES for New Jersey Department of Environmental Protection and Energy, Spring 1992. Limiting Nonpoint Source Pollution from New Development in the New Jersey Coastal Zone. West Chester, PA.

SCHUELER, T. R., 1987. Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs. Department of Environmental Programs, Metropolitan Washington Council of Governments.

# POLLUTANT LOADINGS FOR 1986 LAND USE

## POUNDS/YEAR

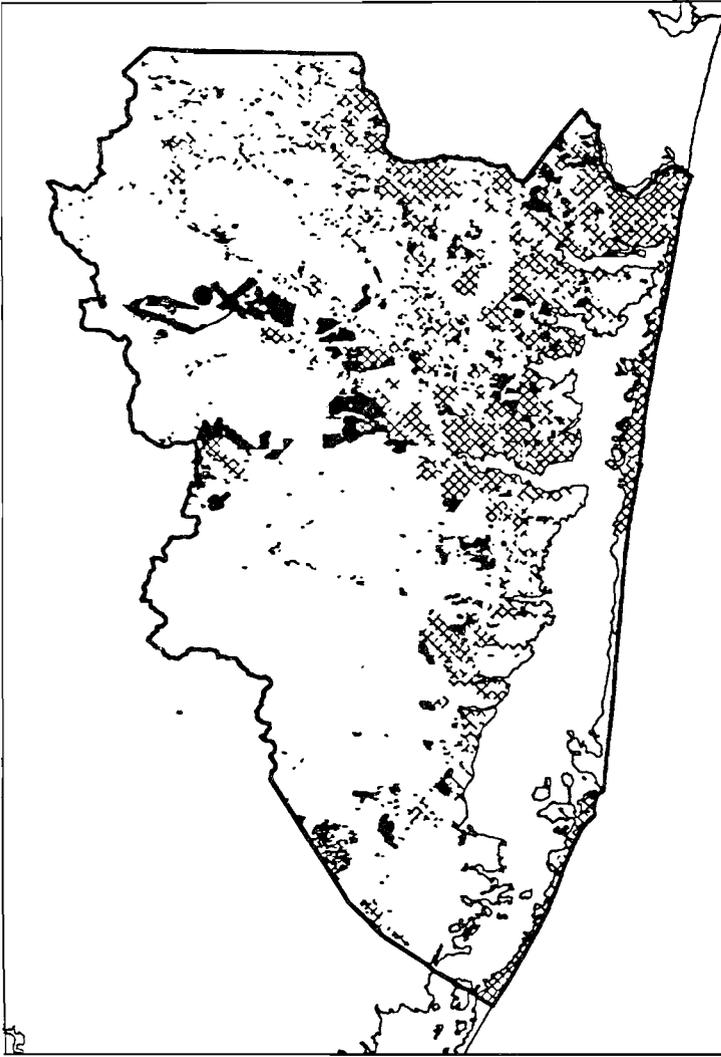
MUNICIPALITY	PHOSPHOROUS	NITROGEN	BOD	ZINC	LEAD
Barneгат Light	235.60	1809.34	4636.28	33.93	17.65
Barneгат	435.51	5134.69	4621.90	62.84	31.94
Bay Head	165.71	1277.28	3256.06	23.65	12.22
Beachwood	568.63	4397.51	11159.77	80.63	42.66
Berkeley	3425.91	7047.07	17987.21	491.53	248.54
Brick	4140.08	31933.71	79822.49	588.96	309.82
Dover	4997.47	38471.28	98126.28	710.11	371.97
Harvey Cedars	136.50	1054.19	2679.40	19.27	10.38
Island Heights	107.51	827.40	2112.26	14.94	8.54
Jackson	5022.49	38601.24	98685.94	720.37	361.98
Lacey	2100.51	16195.47	41230.90	300.16	153.24
Lakehurst	134.45	1031.59	2638.18	19.45	9.73
Lakewood	2278.87	17554.54	44735.33	324.25	170.51
Lavallette	237.58	1830.67	12466.14	34.28	17.00
Long Beach	283.22	2185.42	5560.90	39.71	21.95
Manchester	3166.90	24390.22	62204.36	452.05	232.91
Mantoloking	108.37	835.01	2127.91	15.39	10.44
Ocean Gate	138.37	1070.25	2712.91	19.58	8.12
Ocean Township	447.59	3449.73	8024.74	49.35	31.14
Pine Beach	175.41	1355.04	3442.26	24.91	13.15
Point Pleasant Beach	757.02	5826.41	14879.57	108.64	54.70
Point Pleasant	1585.74	12185.82	31198.43	227.68	114.80
Seaside Heights	224.77	1728.93	4420.93	32.39	16.11
Seaside Park	293.12	2253.64	5766.31	42.34	20.92
Ship Bottom	67.10	517.91	1317.23	9.56	5.19
South Toms River	238.22	1840.53	4676.32	33.59	17.65
Stafford	376.89	2899.40	7388.31	53.36	26.14
Surf City	274.24	2111.75	5391.11	39.23	20.12
<b>TOTAL</b>	<b>32123.78</b>	<b>229816.04</b>	<b>583269.43</b>	<b>4572.15</b>	<b>2359.52</b>

# POLLUTANT LOADINGS AT BUILD OUT

POUNDS/YEAR

MUNICIPALITY	PHOSPHOROUS	NITROGEN	BOD	ZINC	LEAD
Barnegat Light	162.78	1249.89	3196.35	23.47	11.73
Barnegat	1979.36	15227.02	38908.64	285.93	143.36
Bay Head	377.32	2898.82	7413.02	54.24	27.12
Beachwood	954.46	7316.48	18693.94	139.2	70.14
Berkeley	15810.75	121446.03	309026.77	2249.38	1145.07
Brick	5328.07	40930.28	104566.14	766.85	385.56
Dover	8405.10	64648.5	165084.5	1208.37	607.91
Island Heights	190.06	1457.22	3726.76	27.59	13.79
Harvey Cedars	91.38	699.66	1789.38	13.36	6.68
Jackson	12847.2	99056.01	252555.32	1833.42	930.1
Lacey	5190.65	40306.54	101889.73	747.44	377.93
Lakehurst	396.55	3049.13	7789.01	56.91	28.71
Lakewood	6150.99	47335.21	120775.67	822.45	447.93
Lavallette	149.84	1149.49	2939.72	21.7	10.85
Long Beach	296.77	2270.42	5806.96	43.55	3.52
Manchester	7035.3	54317.27	138126.24	1001.96	520.99
Mantoloking	55.19	422.14	1079.69	8.11	4.06
Ocean Gate	78.86	604.22	1545.29	11.49	5.75
Ocean Township	2083.91	16026.78	40872.47	300.06	153.39
Pine Beach	115.64	887.01	2266.28	16.8	8.45
Point Pleasant Beach	578.09	4441.42	11355.42	83.13	41.64
Point Pleasant	969.67	7450.33	19036.94	140.14	70.65
Seaside Heights	190.84	1471.38	3750.21	27.16	13.94
Seaside Park	170.47	1310.6	3344.87	24.53	12.46
Ship Bottom	151.74	1168.52	2982.95	21.64	10.97
South Toms River	225.77	1733.21	4431.73	32.59	16.3
Stafford	2788.53	21438.13	54796	404.26	200.53
Surf City	164.21	1259.29	3220.54	23.81	35.34
<b>TOTAL</b>	<b>72939.5</b>	<b>561571</b>	<b>1430970.54</b>	<b>10389.54</b>	<b>5304.87</b>

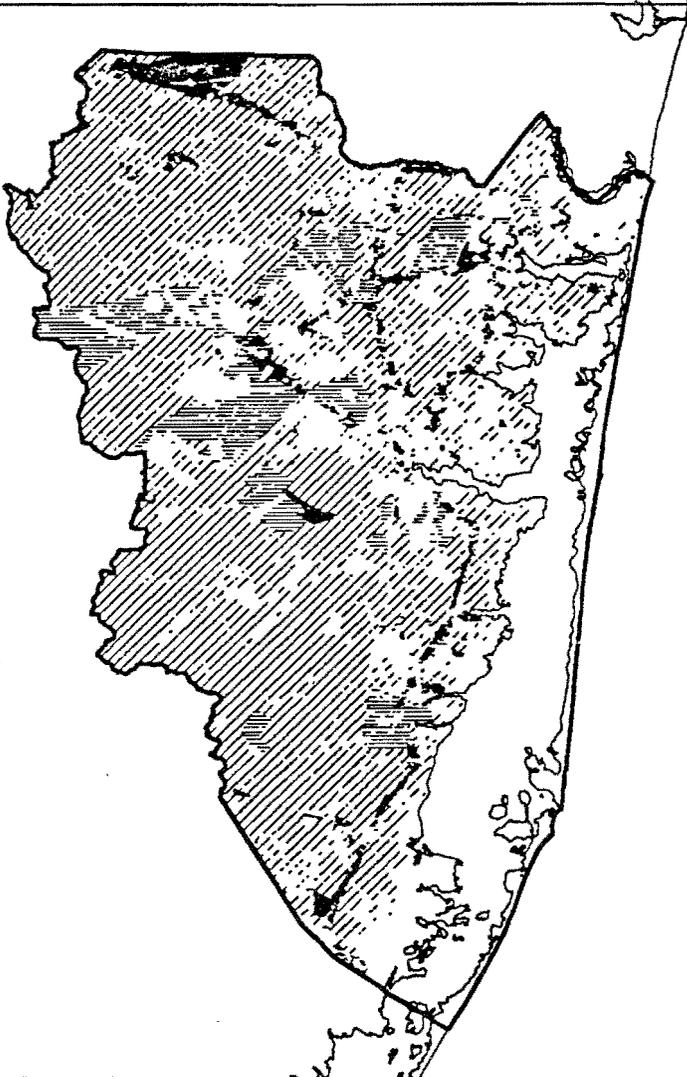
STAGES OF DEVELOPMENT  
IN THE  
BARNEGAT BAY STUDY AREA



- ▣ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND



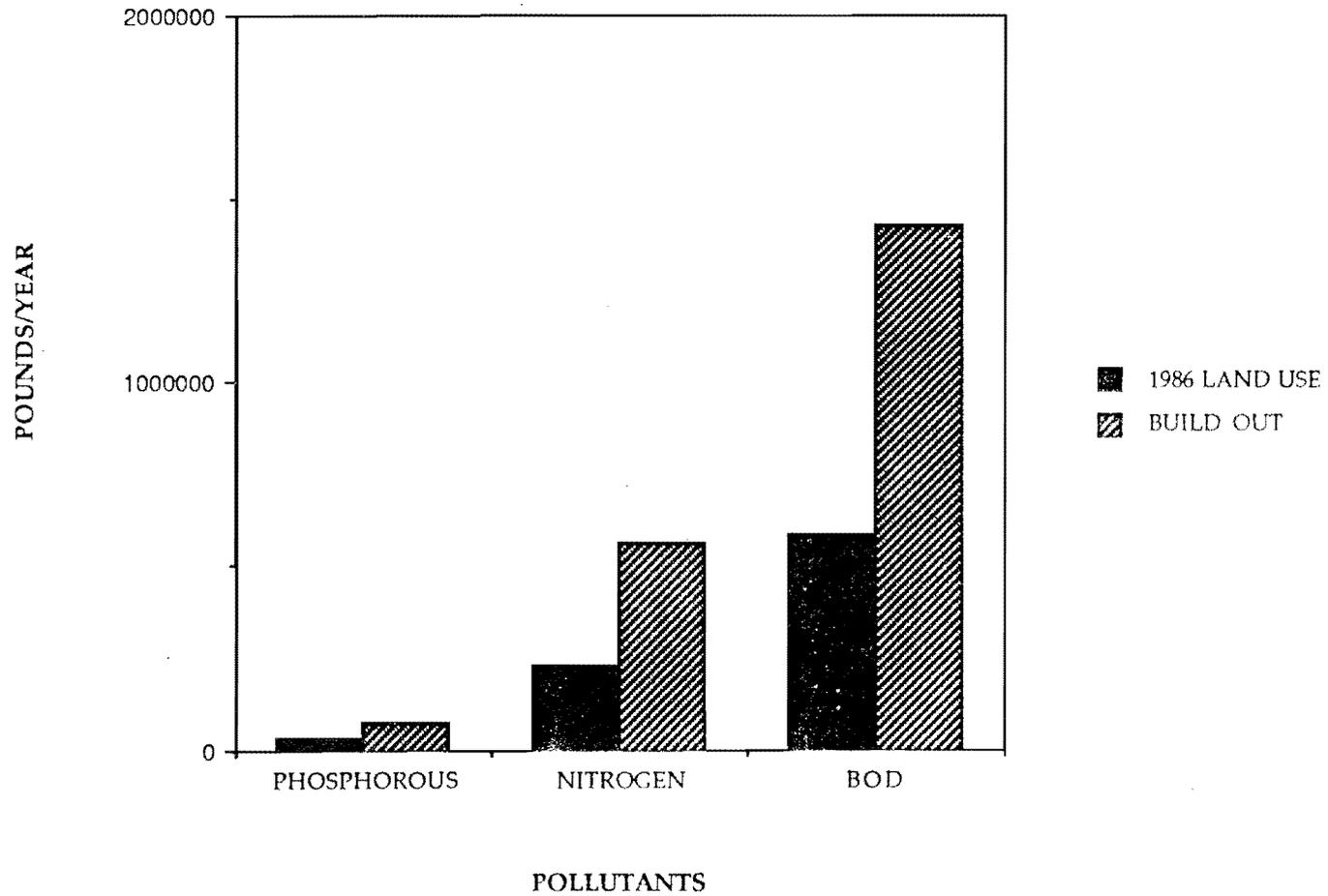
ZONING FOR  
UNDEVELOPED LAND IN THE  
BARNEGAT BAY STUDY AREA



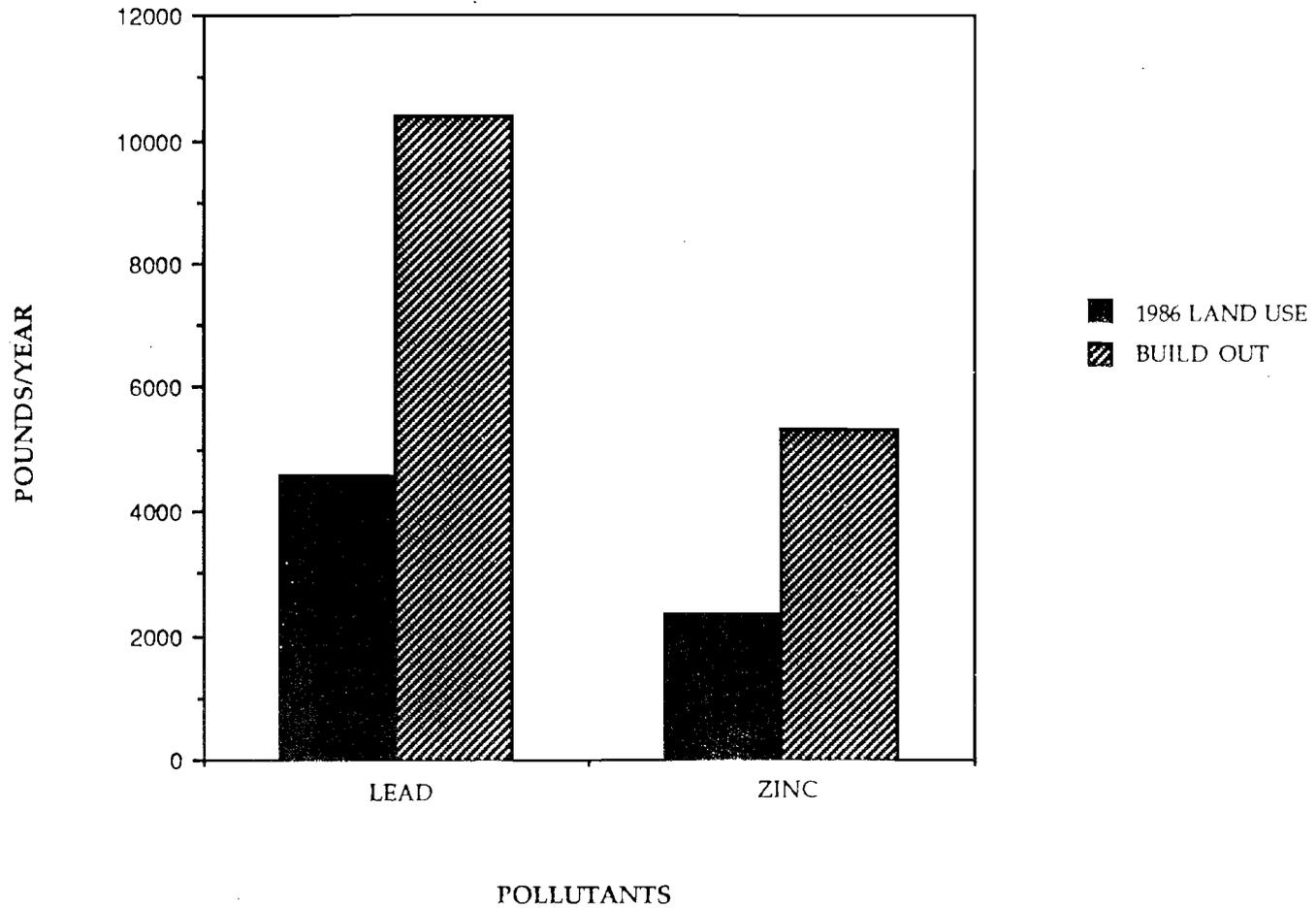
- ▨ RESIDENTIAL
- COMMERCIAL
- ▨ INDUSTRIAL



BARNEGAT BAY STUDY AREA  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT



BARNEGAT BAY STUDY AREA  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT

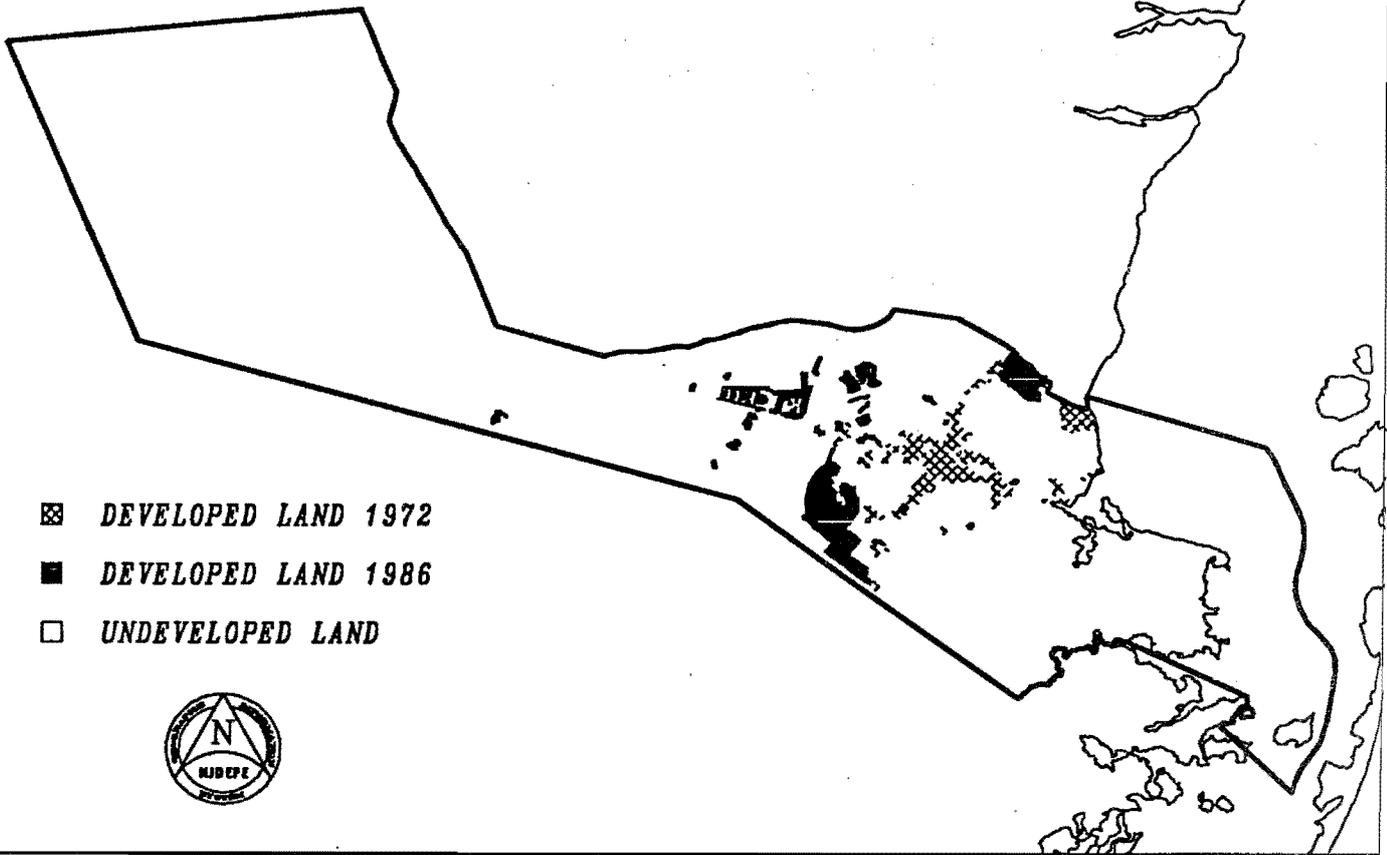


**RESULTS FOR MUNICIPALITIES WITHIN THE BARNEGAT BAY  
STUDY AREA THAT HAVE LAND AVAILABLE FOR DEVELOPMENT**

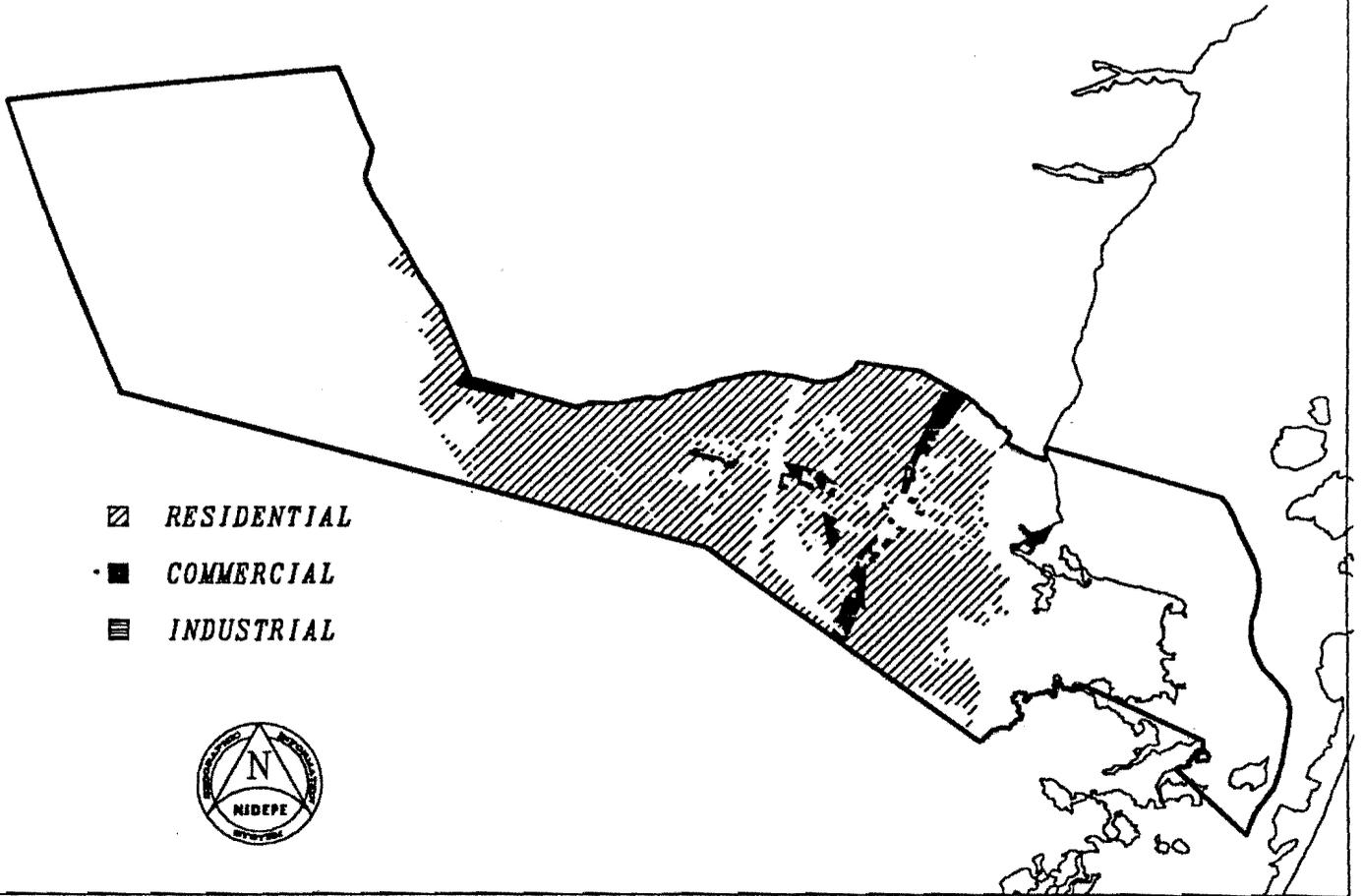


# STAGES OF DEVELOPMENT IN BARNEGAT TWP

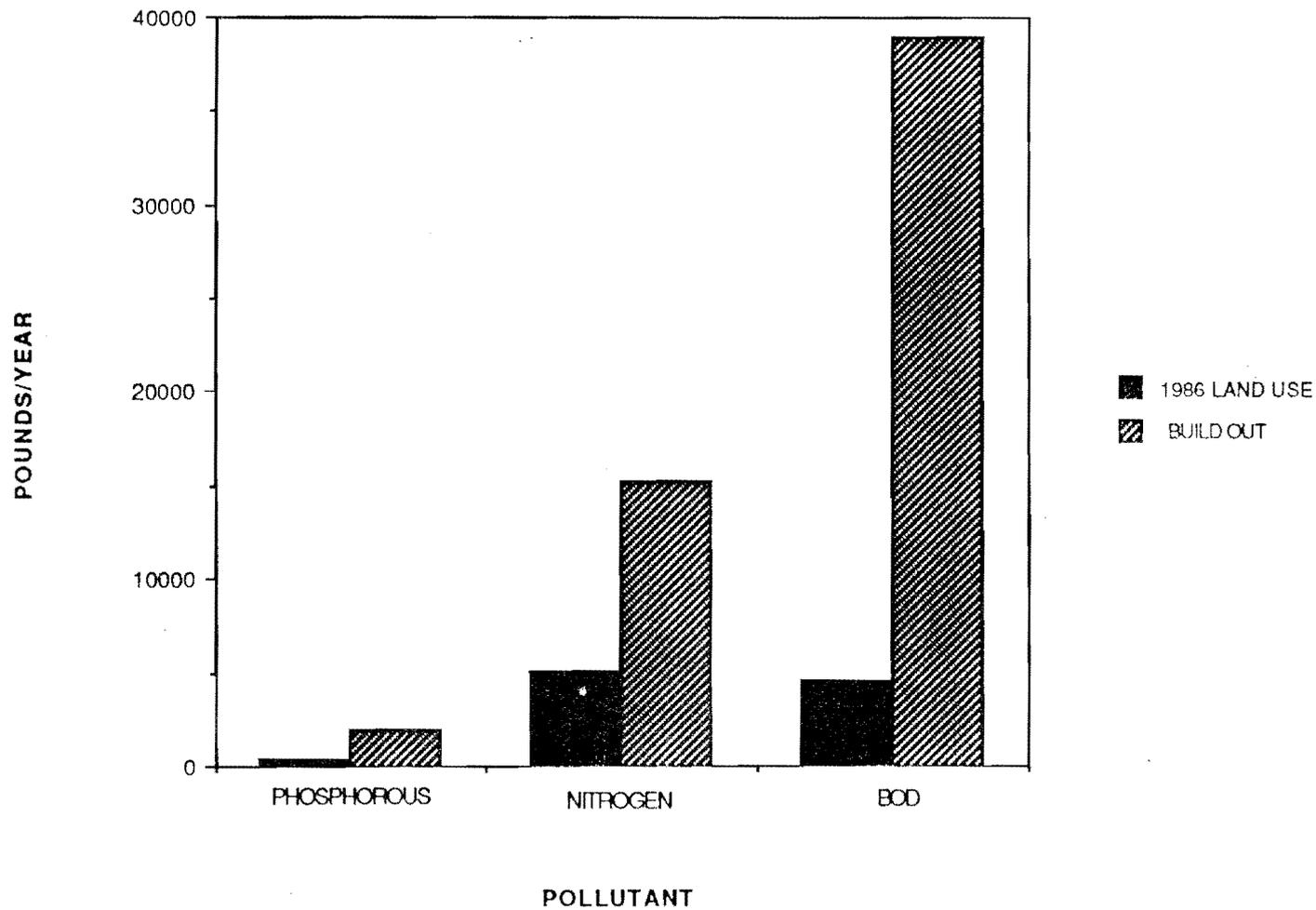
POPULATION - 12201  
SIZE - 39.873 SQ. MI.



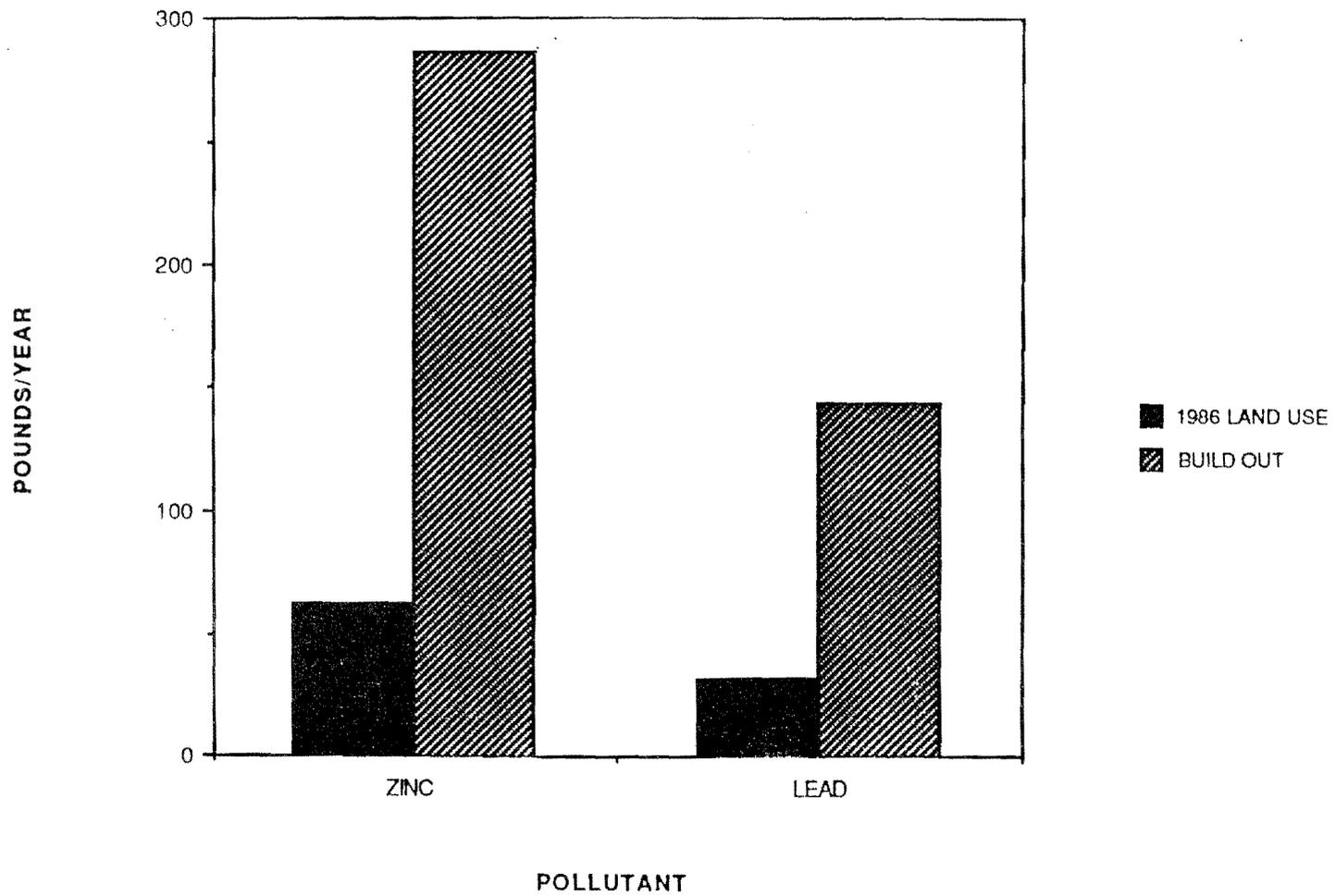
# ZONING FOR UNDEVELOPED LAND IN BARNEGAT TWP



BARNEGAT TOWNSHIP  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT

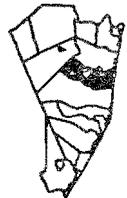


**BARNEGAT TOWNSHIP  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT**

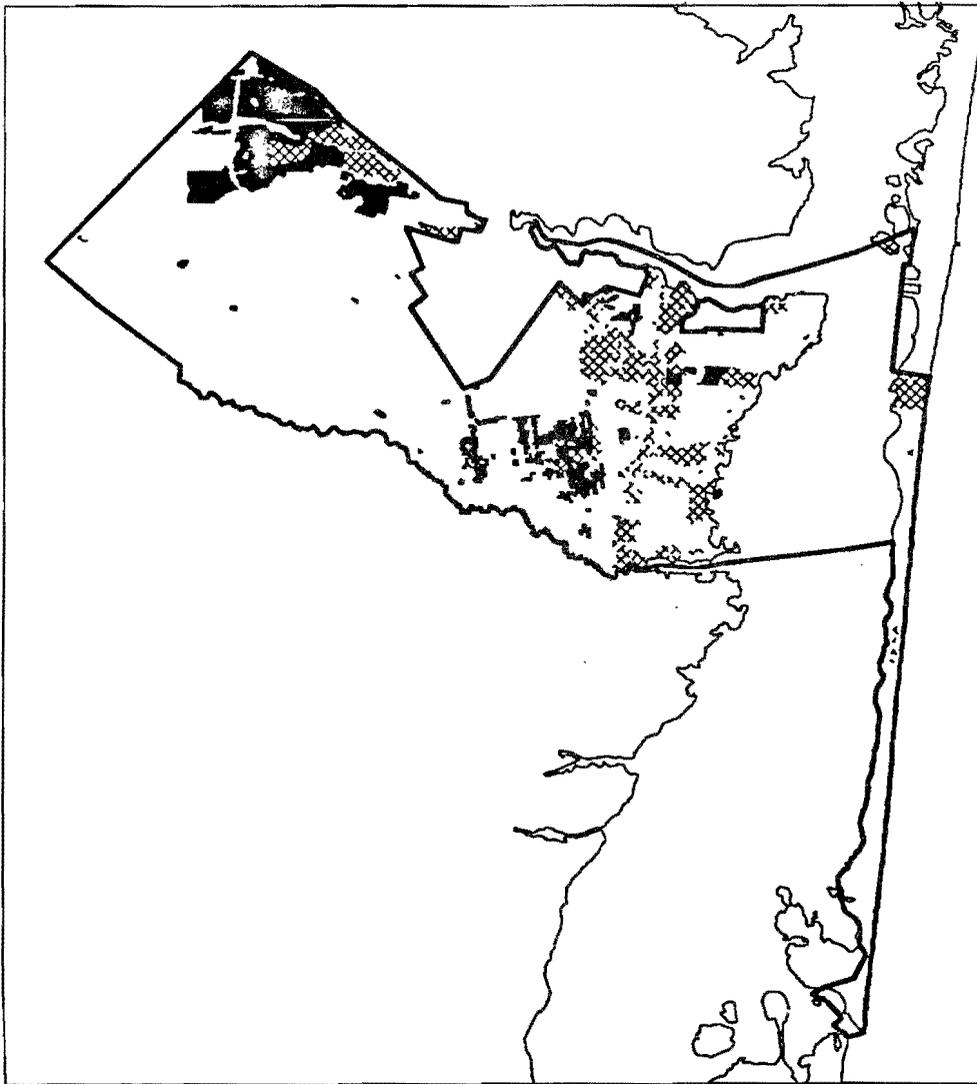


STAGES OF  
DEVELOPMENT IN  
BERKELEY TWP

POPULATION - 36256  
SIZE - 51.609 SQ. MI.

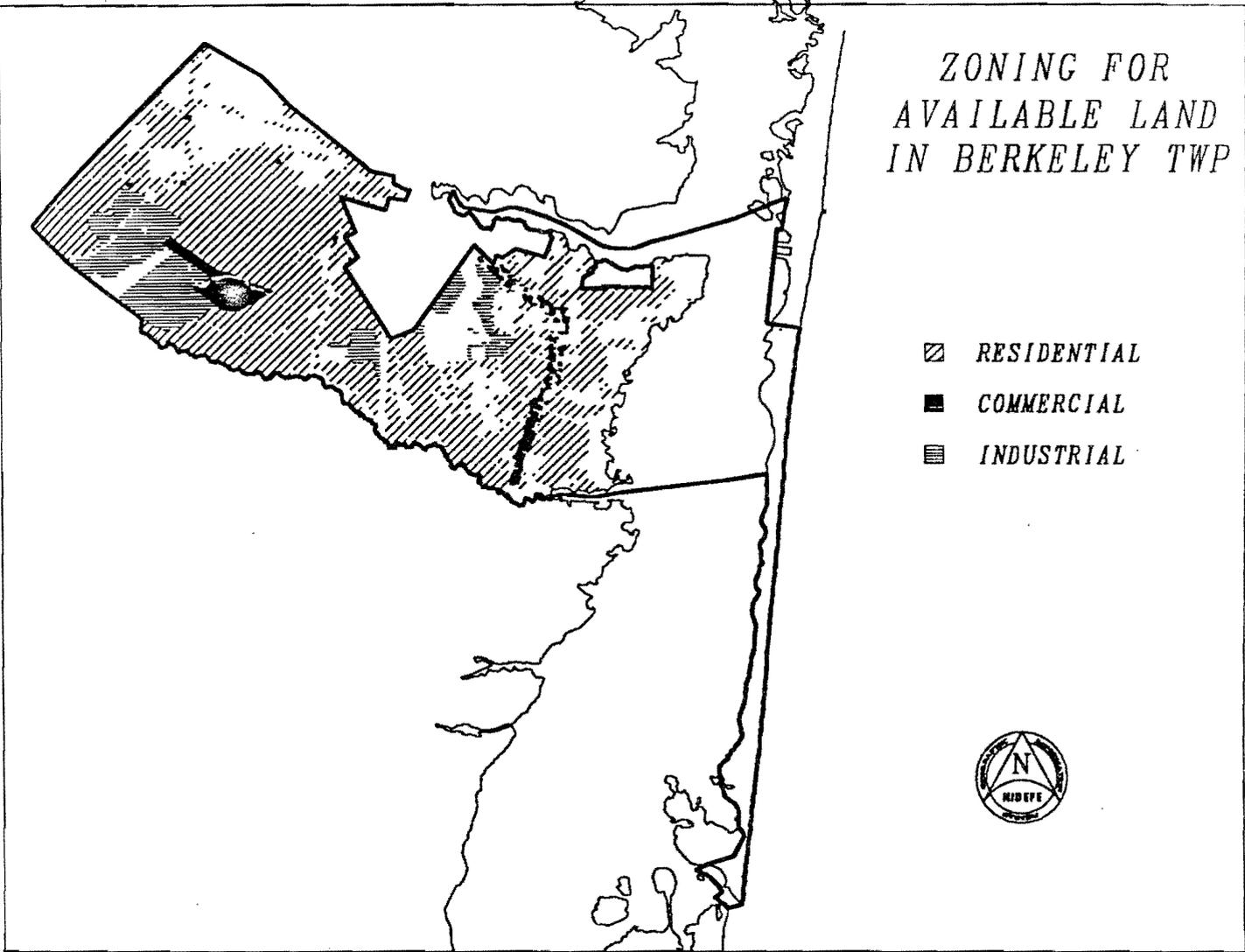


- ▣ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND

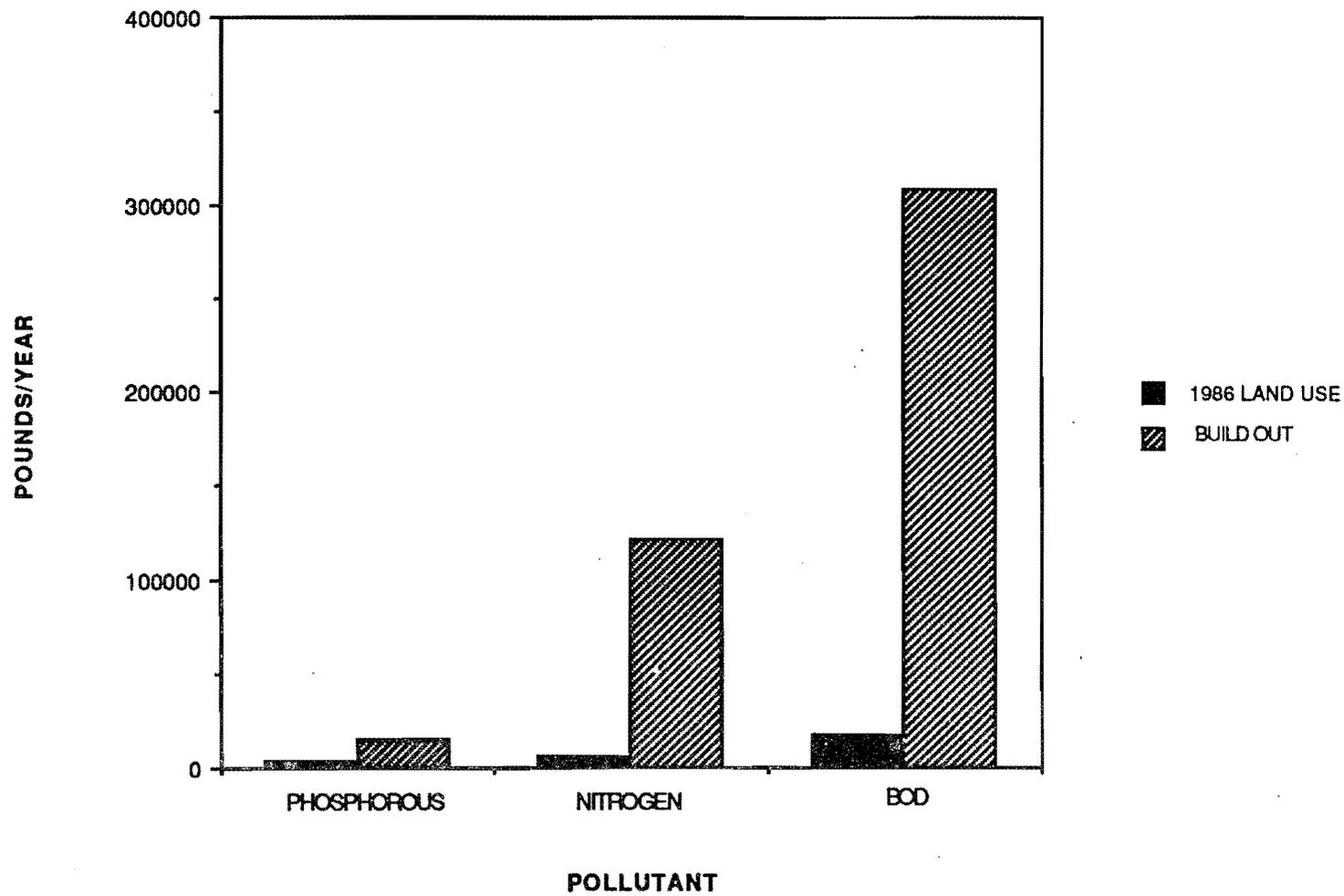


ZONING FOR  
AVAILABLE LAND  
IN BERKELEY TWP

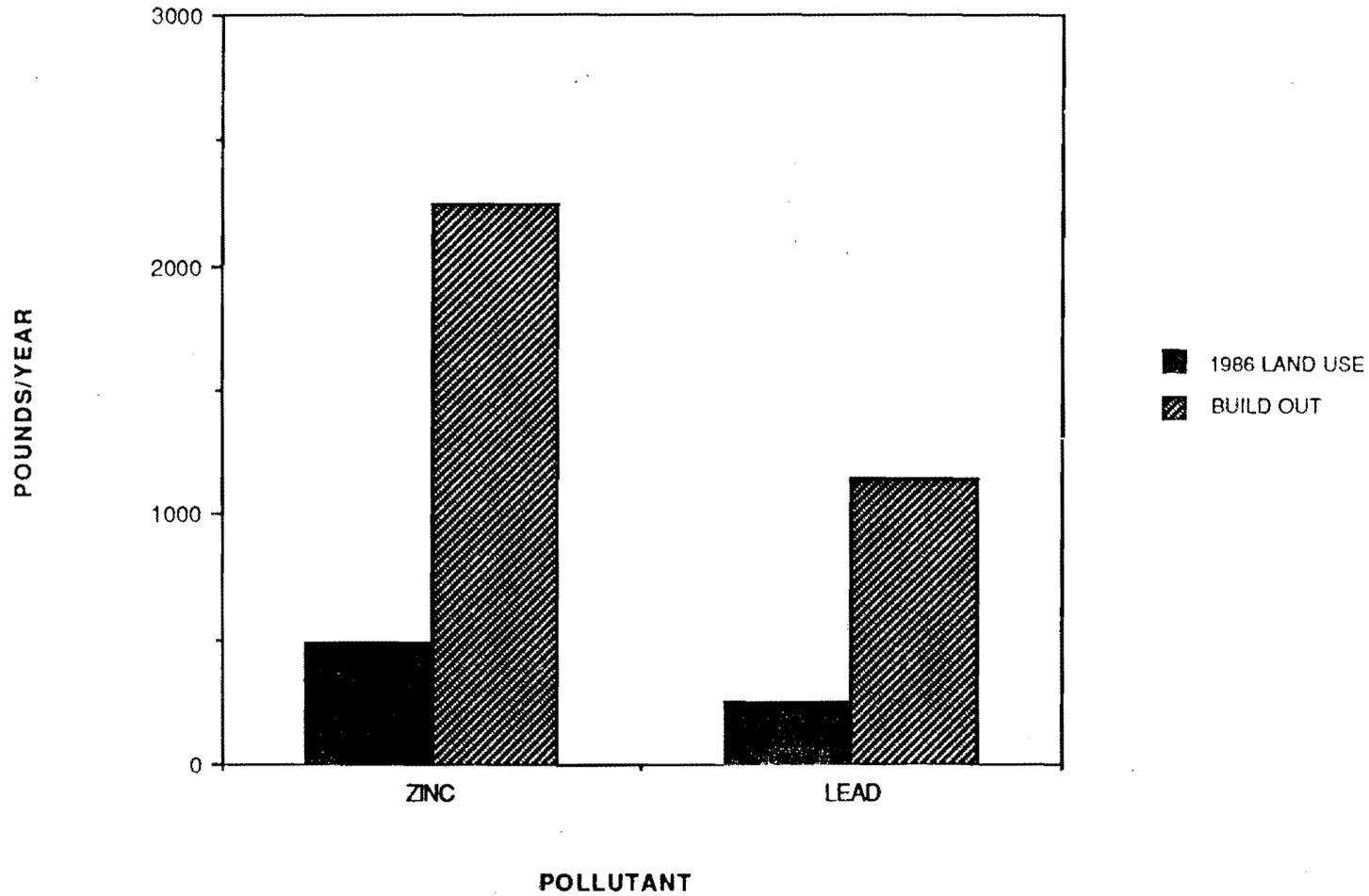
- ▨ RESIDENTIAL
- COMMERCIAL
- ▨ INDUSTRIAL



**BERKELEY TOWNSHIP  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT**

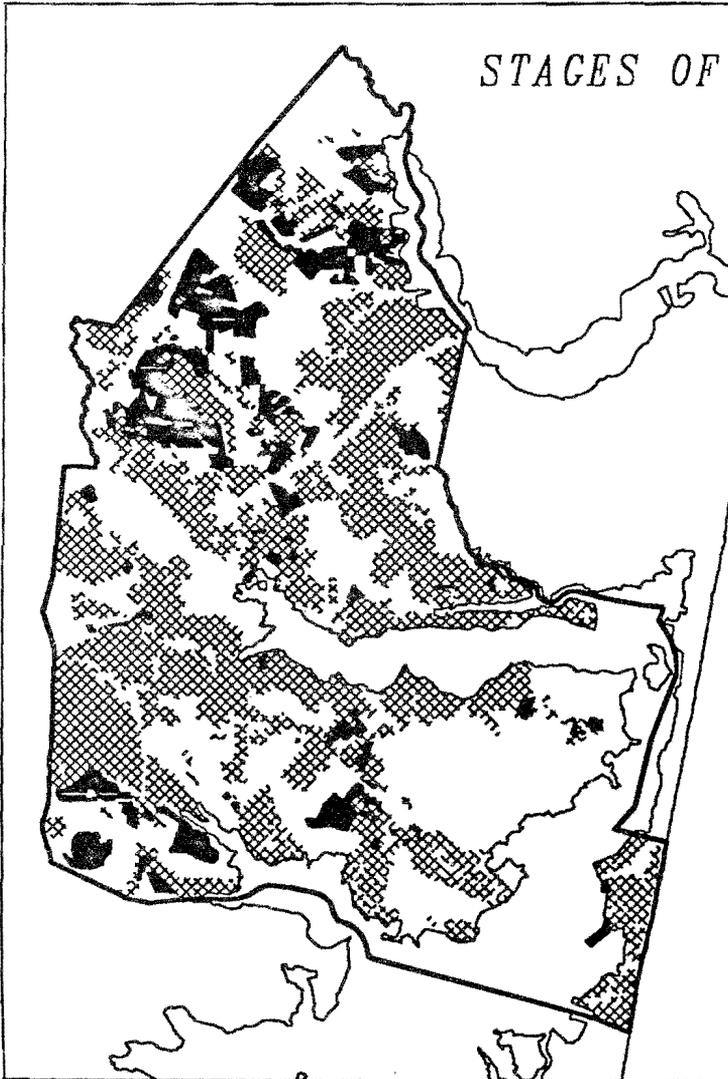


**BERKELEY TOWNSHIP  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT**



# STAGES OF DEVELOPMENT IN BRICK TWP.

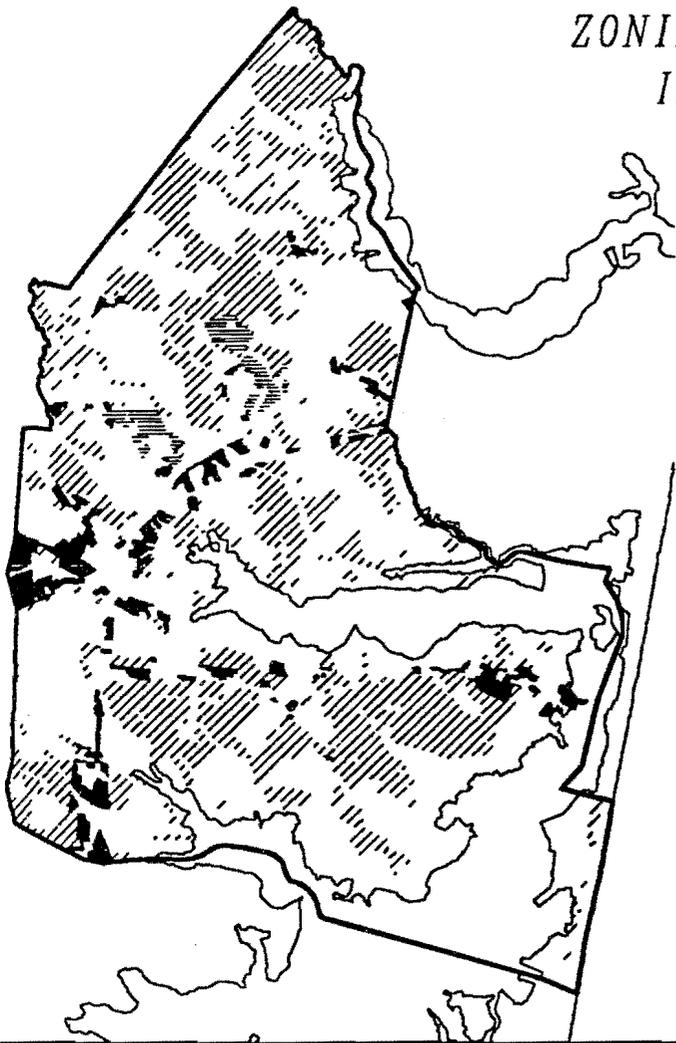
POPULATION - 66225  
SIZE - 32.212 SQ. MI.



- ▣ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND



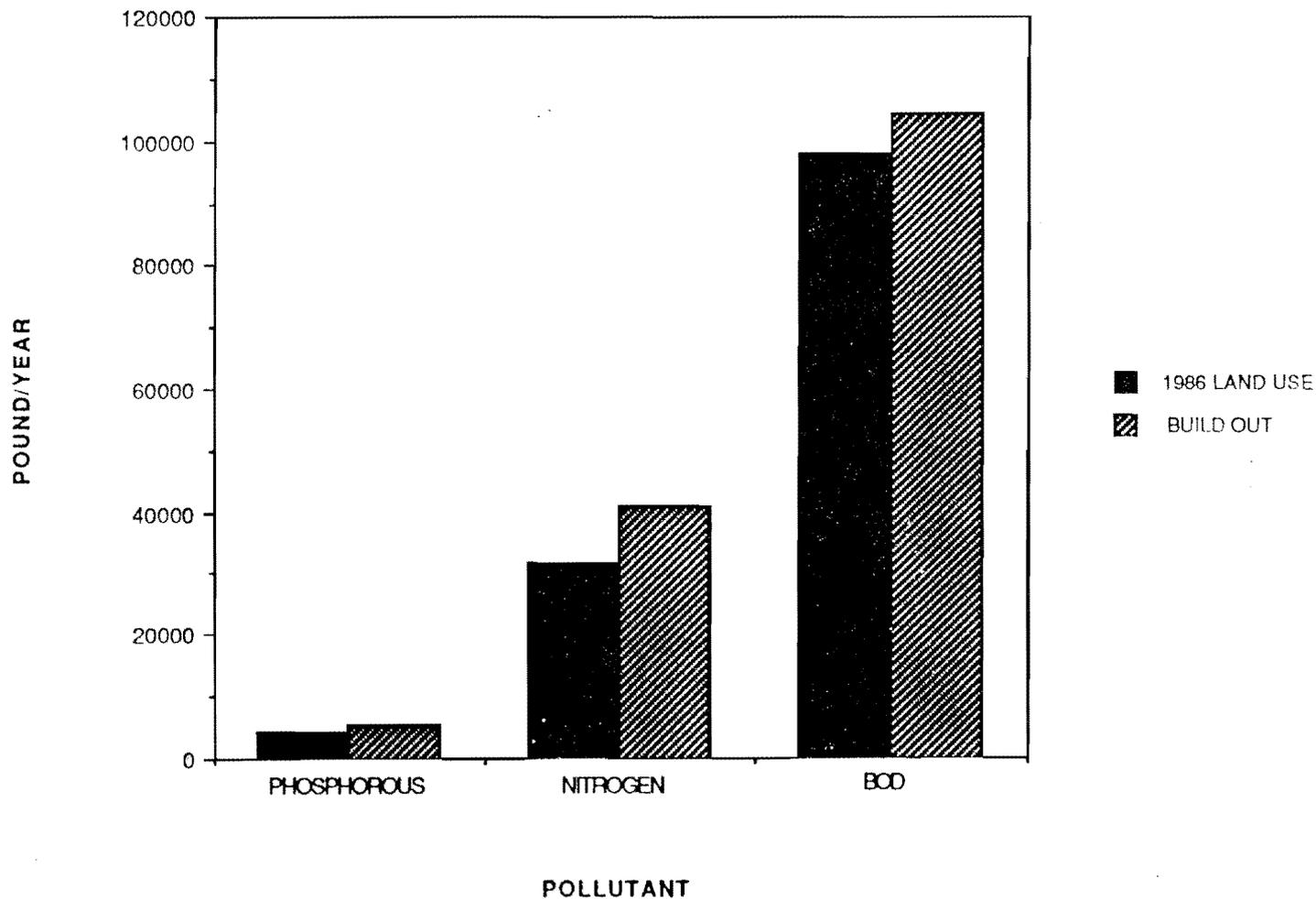
ZONING FOR AVAILABLE LAND  
IN BRICK TOWNSHIP



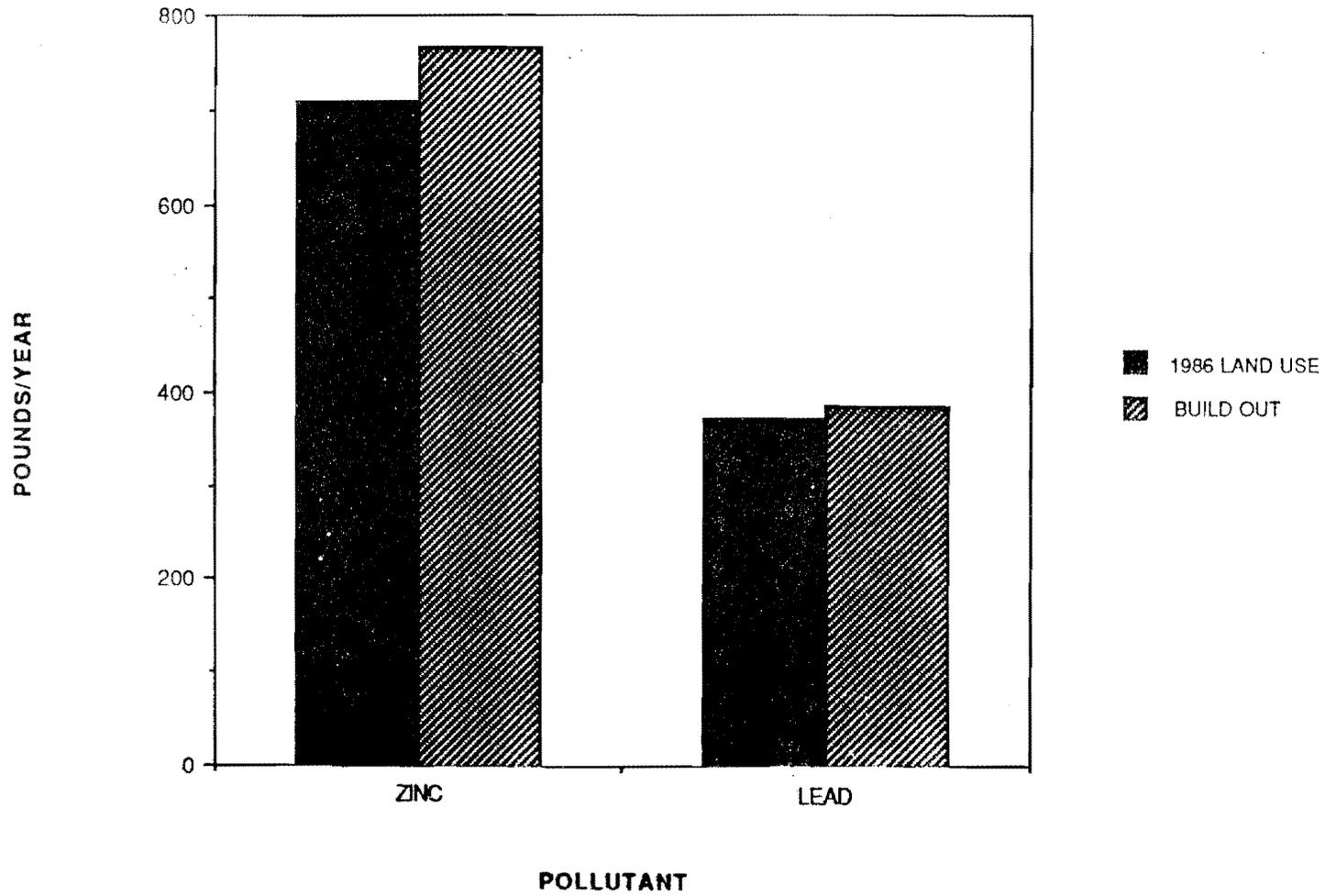
- ▨ RESIDENTIAL
- COMMERCIAL
- ▨ INDUSTRIAL



BRICK TOWNSHIP  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT

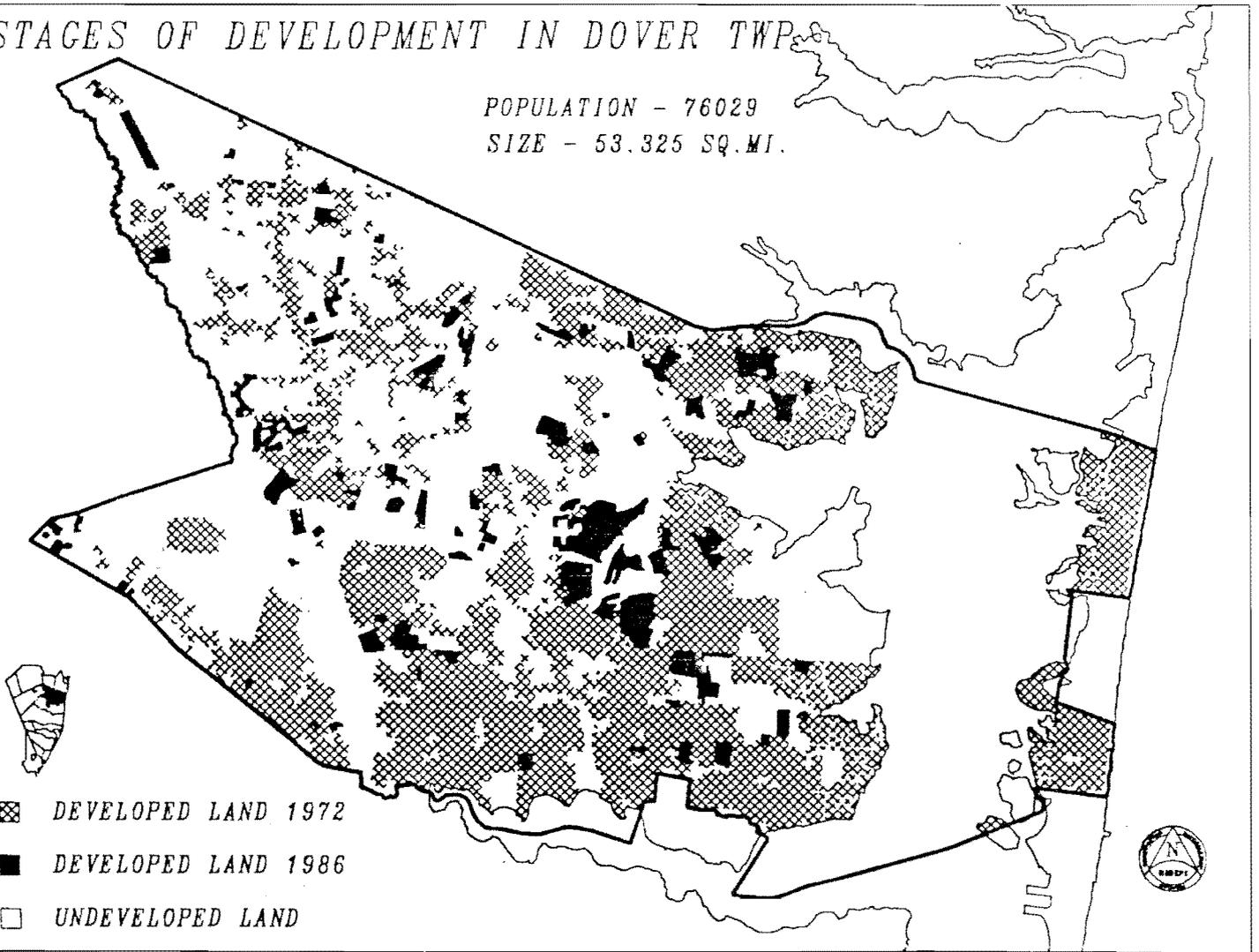


**BRICK TOWNSHIP  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT**



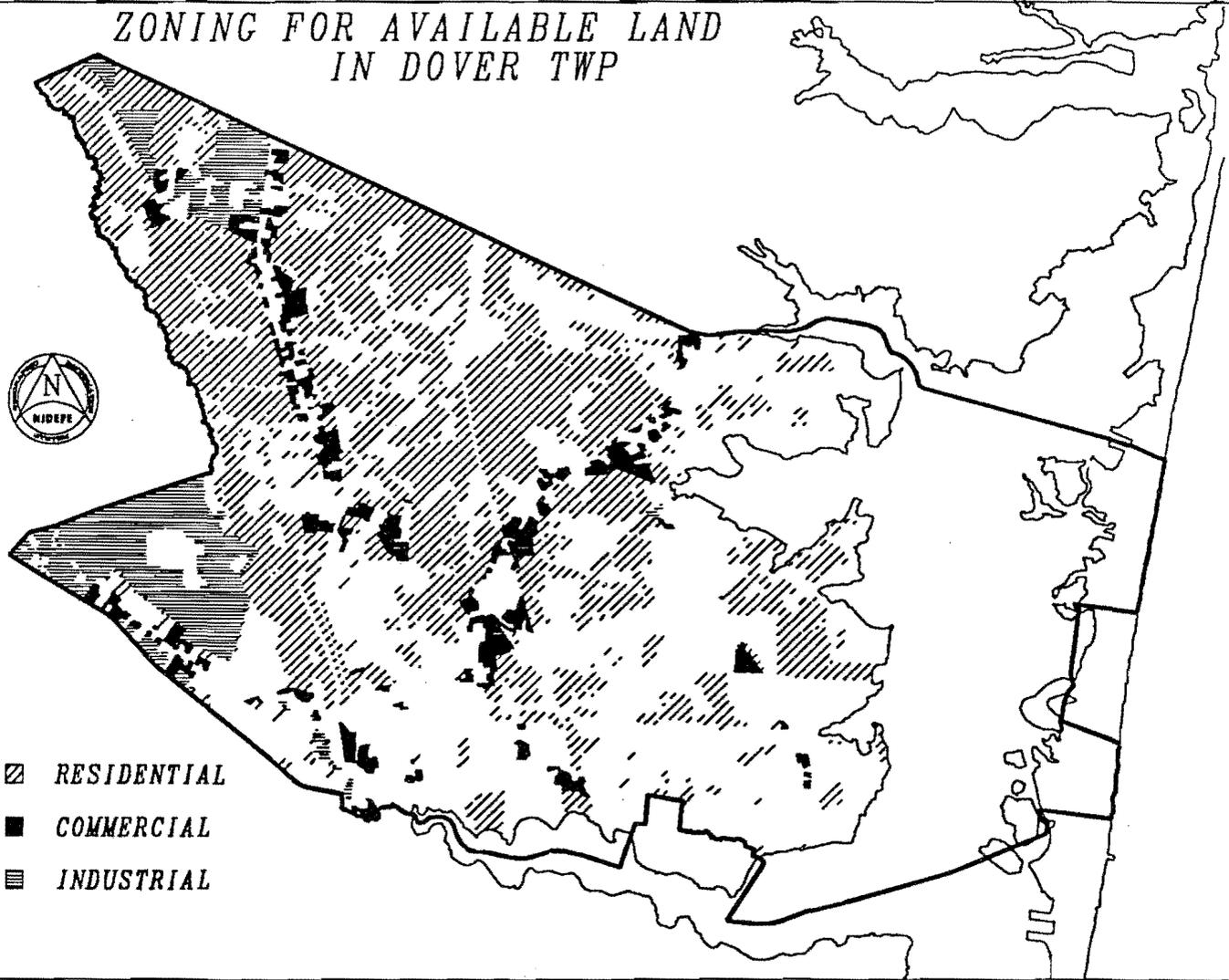
STAGES OF DEVELOPMENT IN DOVER TWP.

POPULATION - 76029  
SIZE - 53.325 SQ. MI.



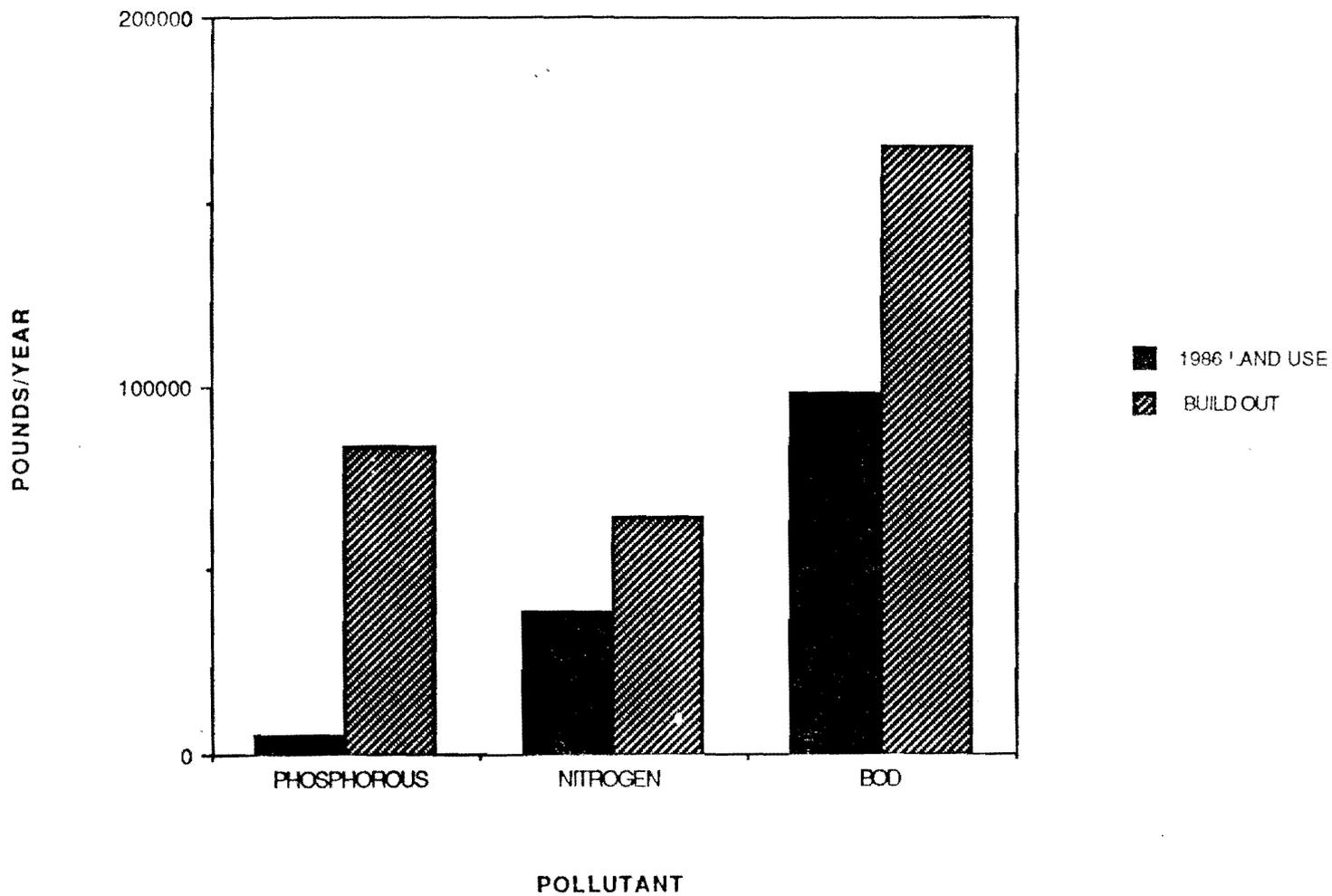
- ▣ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND

ZONING FOR AVAILABLE LAND  
IN DOVER TWP

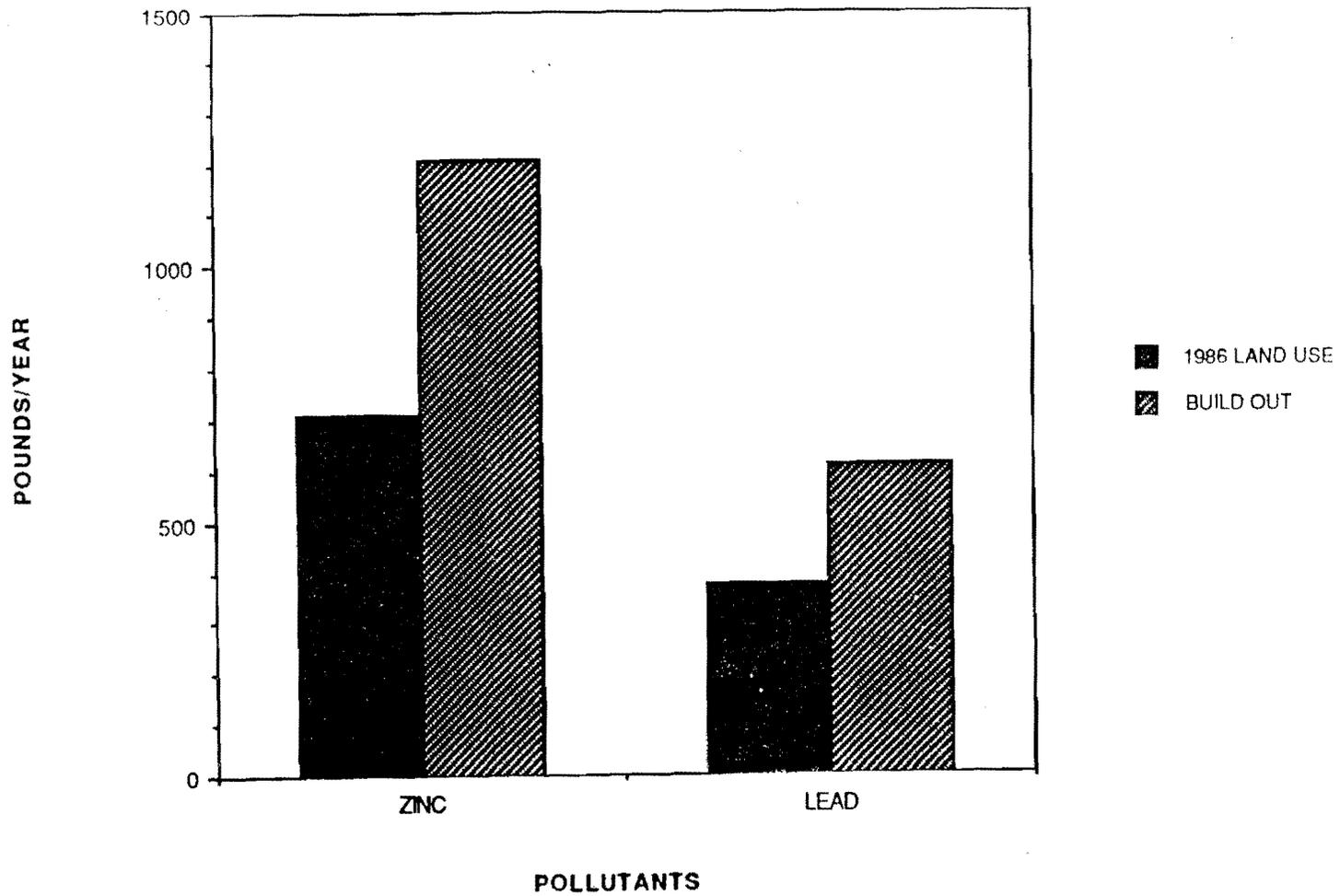


- ▨ RESIDENTIAL
- COMMERCIAL
- ▨ INDUSTRIAL

DOVER TOWNSHIP  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT

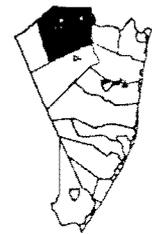


DOVER TOWNSHIP  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT

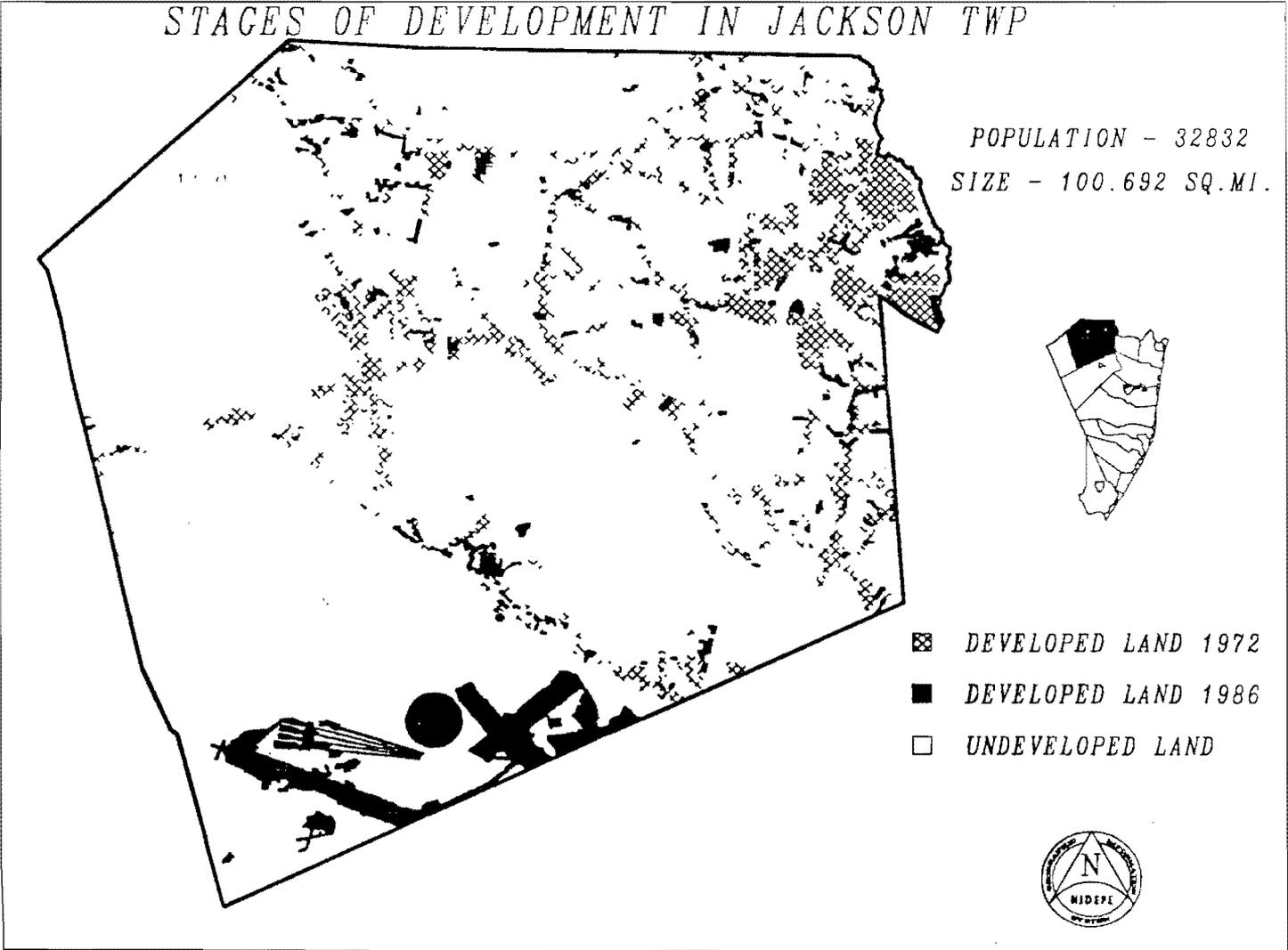


# STAGES OF DEVELOPMENT IN JACKSON TWP

POPULATION - 32832  
SIZE - 100.692 SQ.MI.



- ☒ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND



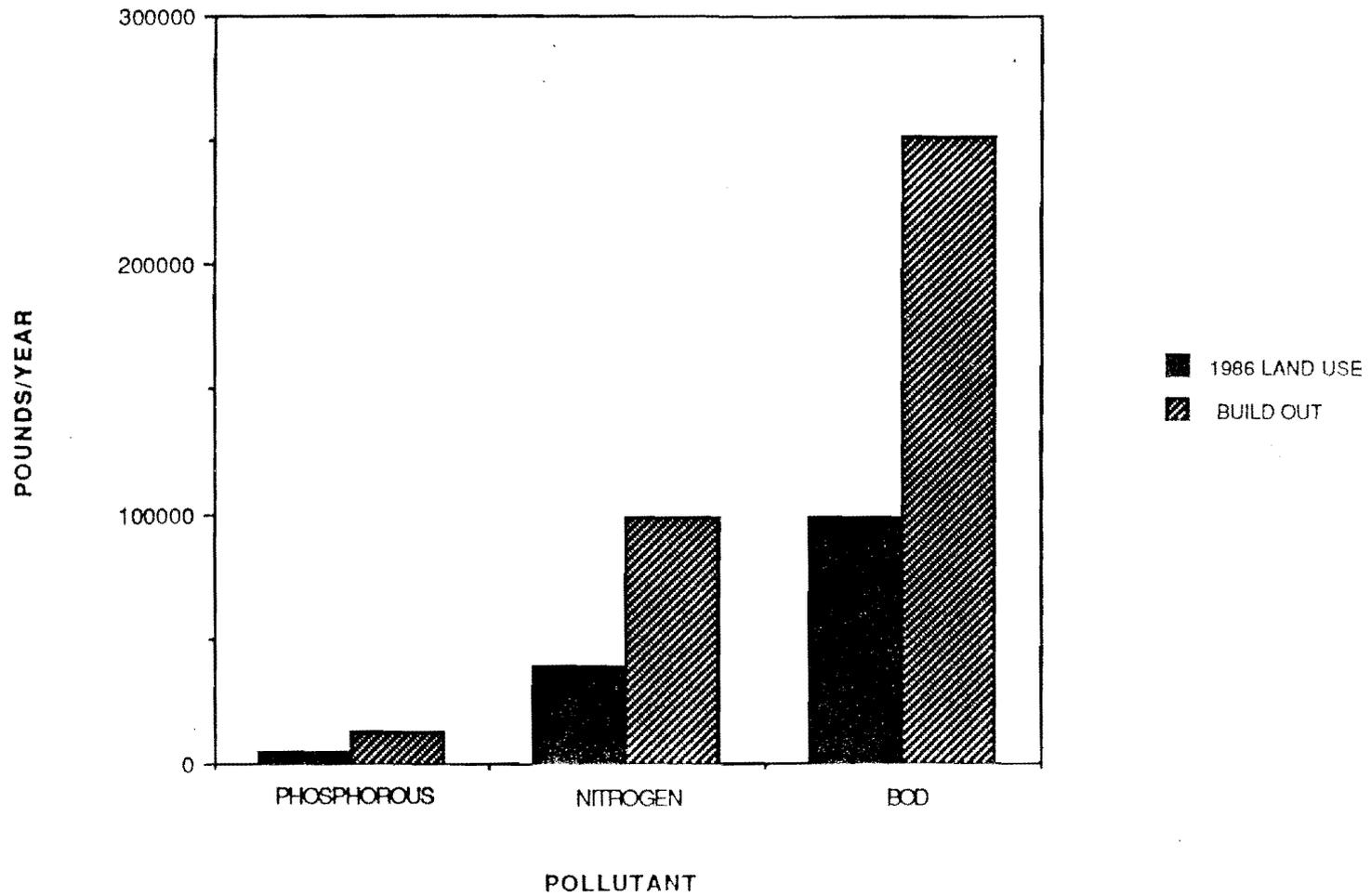
ZONING FOR  
AVAILABLE LAND  
IN  
JACKSON TWP



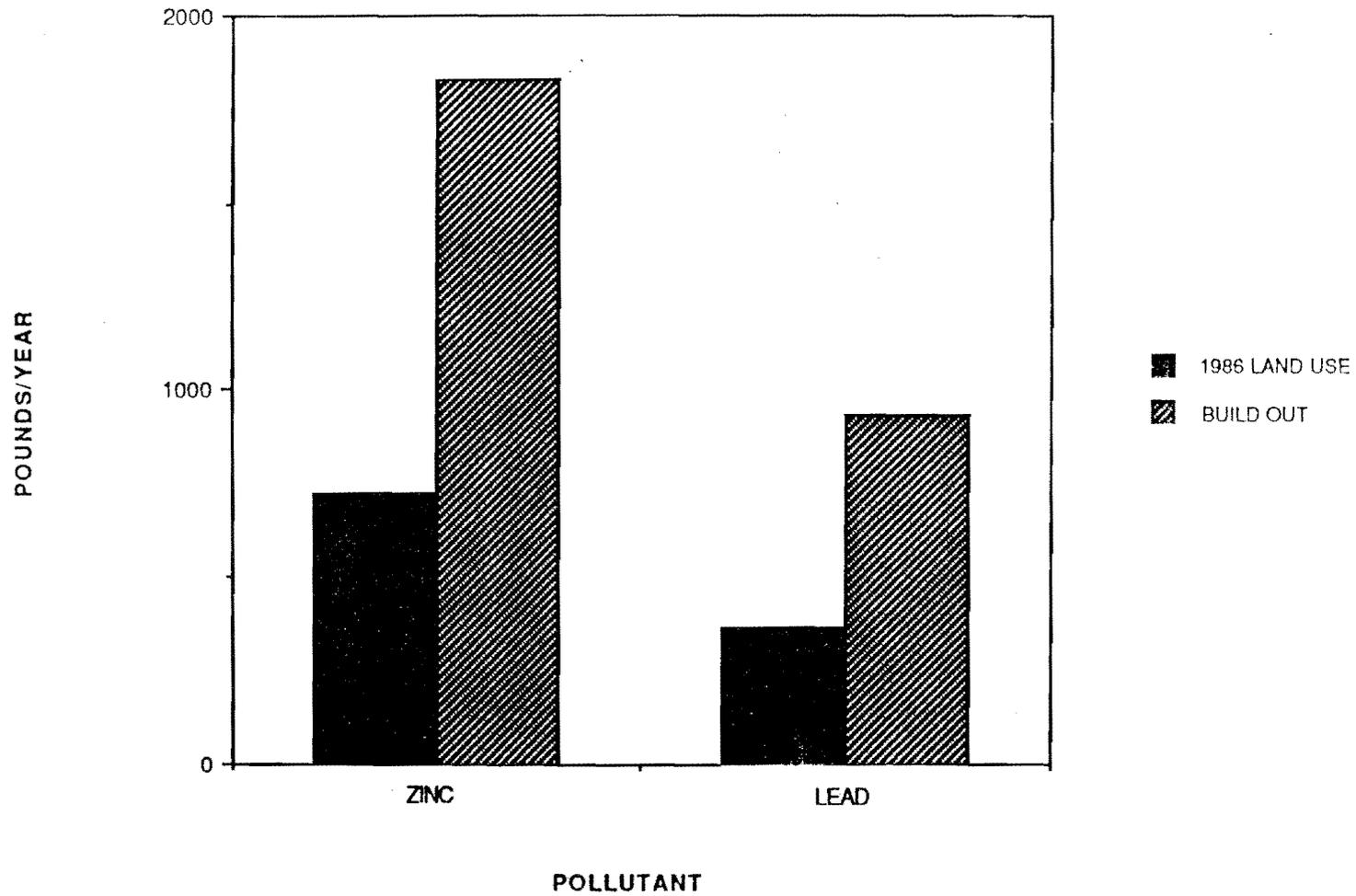
- ▨ RESIDENTIAL
- COMMERCIAL
- ▨ INDUSTRIAL



JACKSON TOWNSHIP  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT



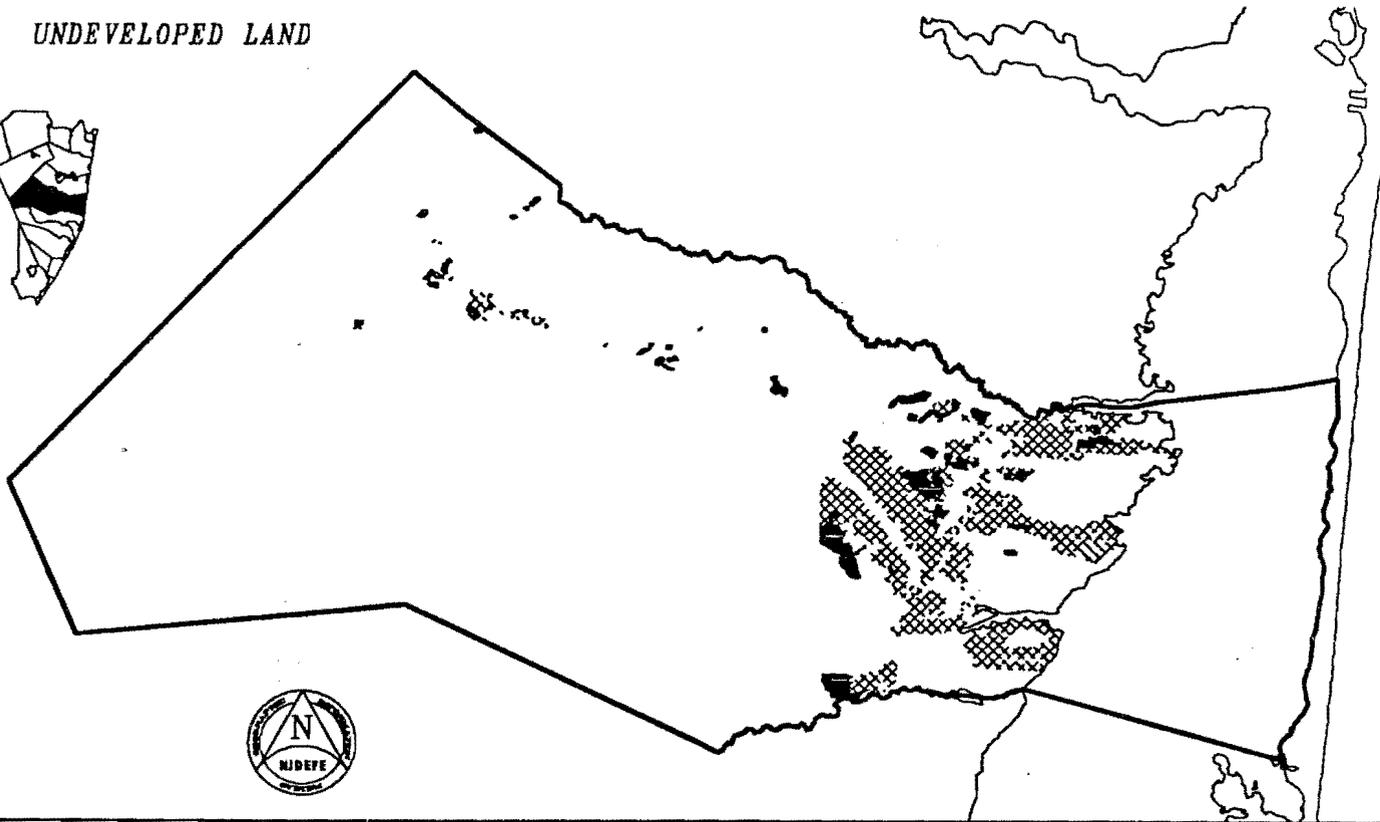
JACKSON TOWNSHIP  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT



# STAGES OF DEVELOPMENT IN LACEY TOWNSHIP

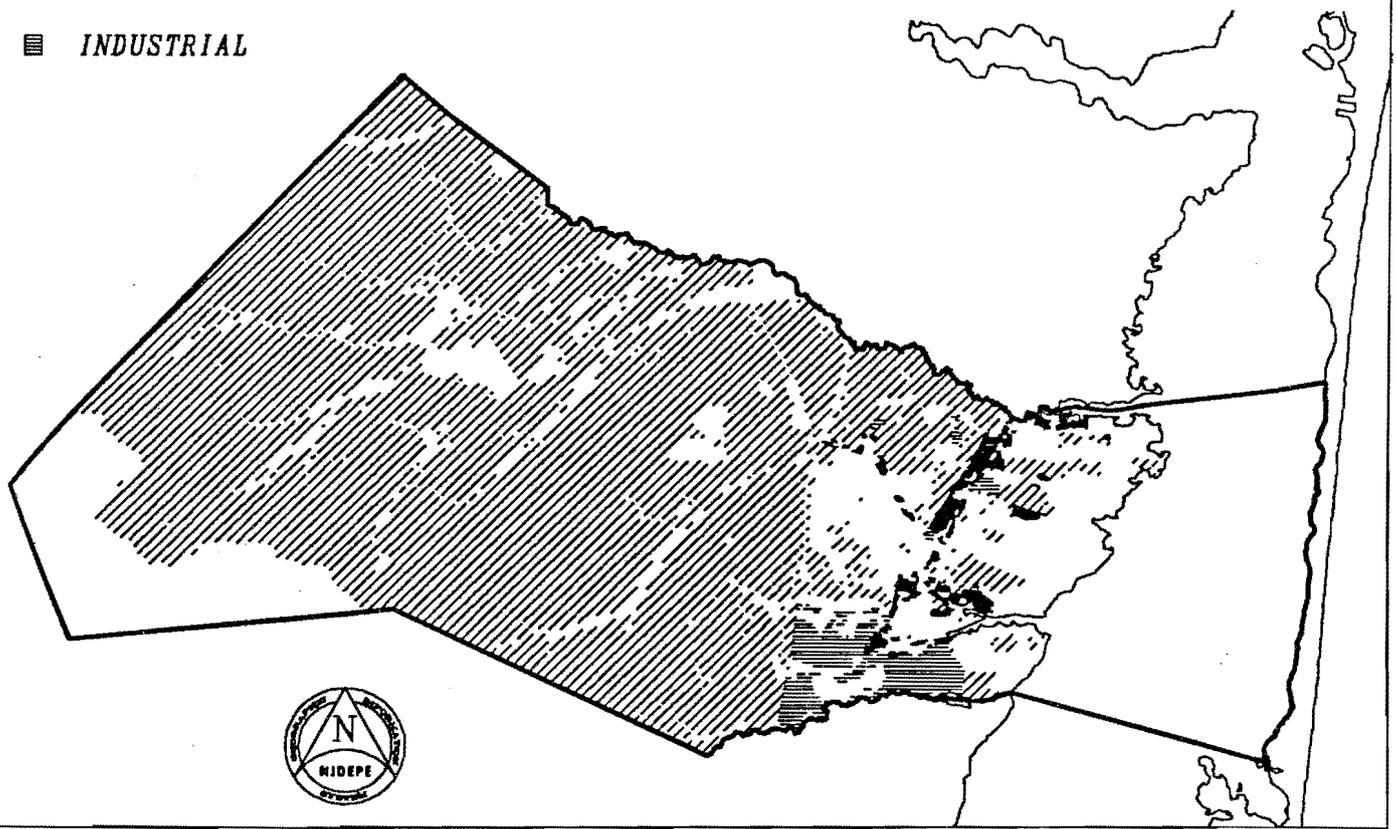
- ☒ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND

POPULATION - 21999  
SIZE - 101.170 SQ. MI.

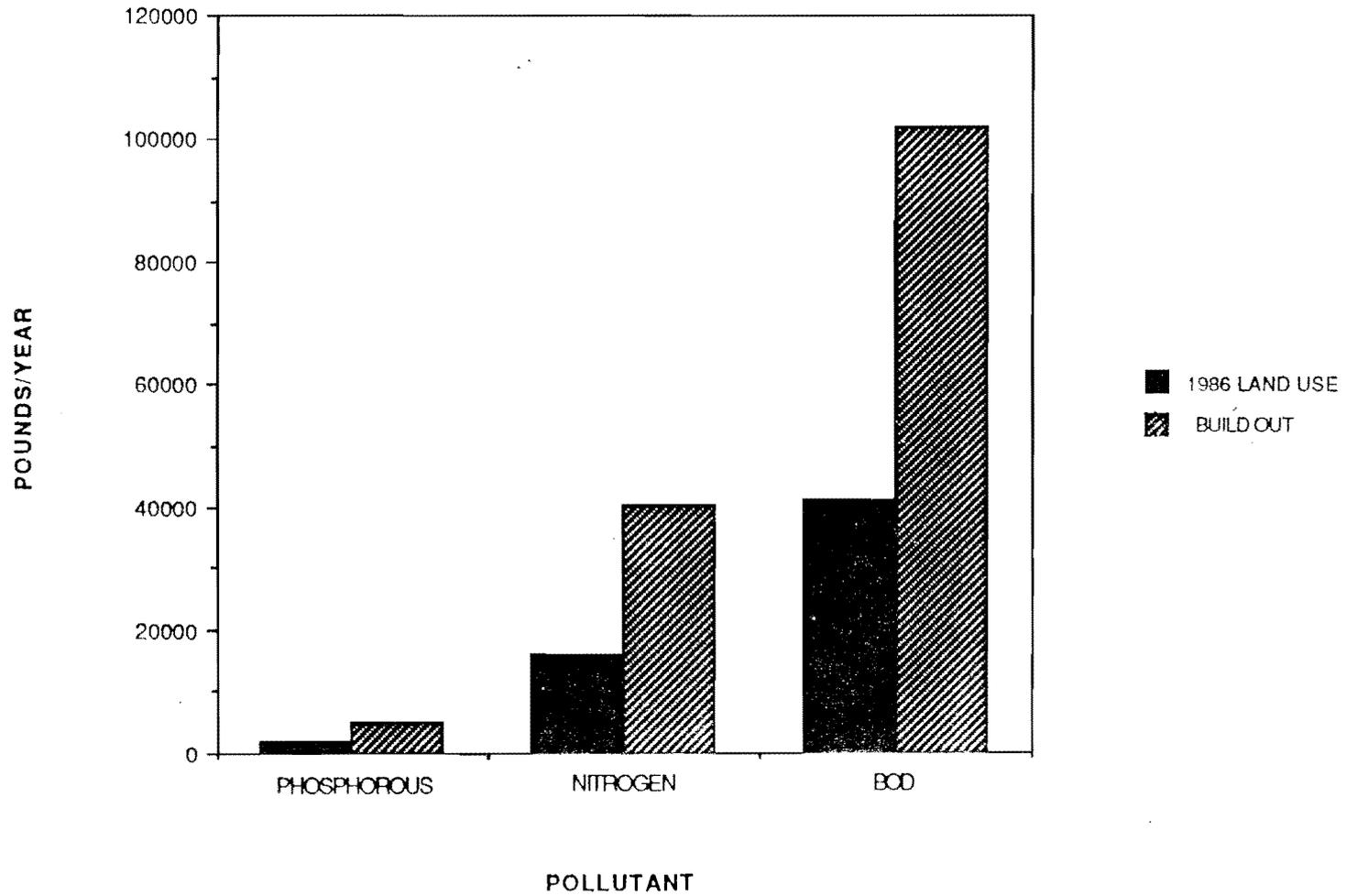


# ZONING FOR AVAILABLE LAND IN LACEY TWP

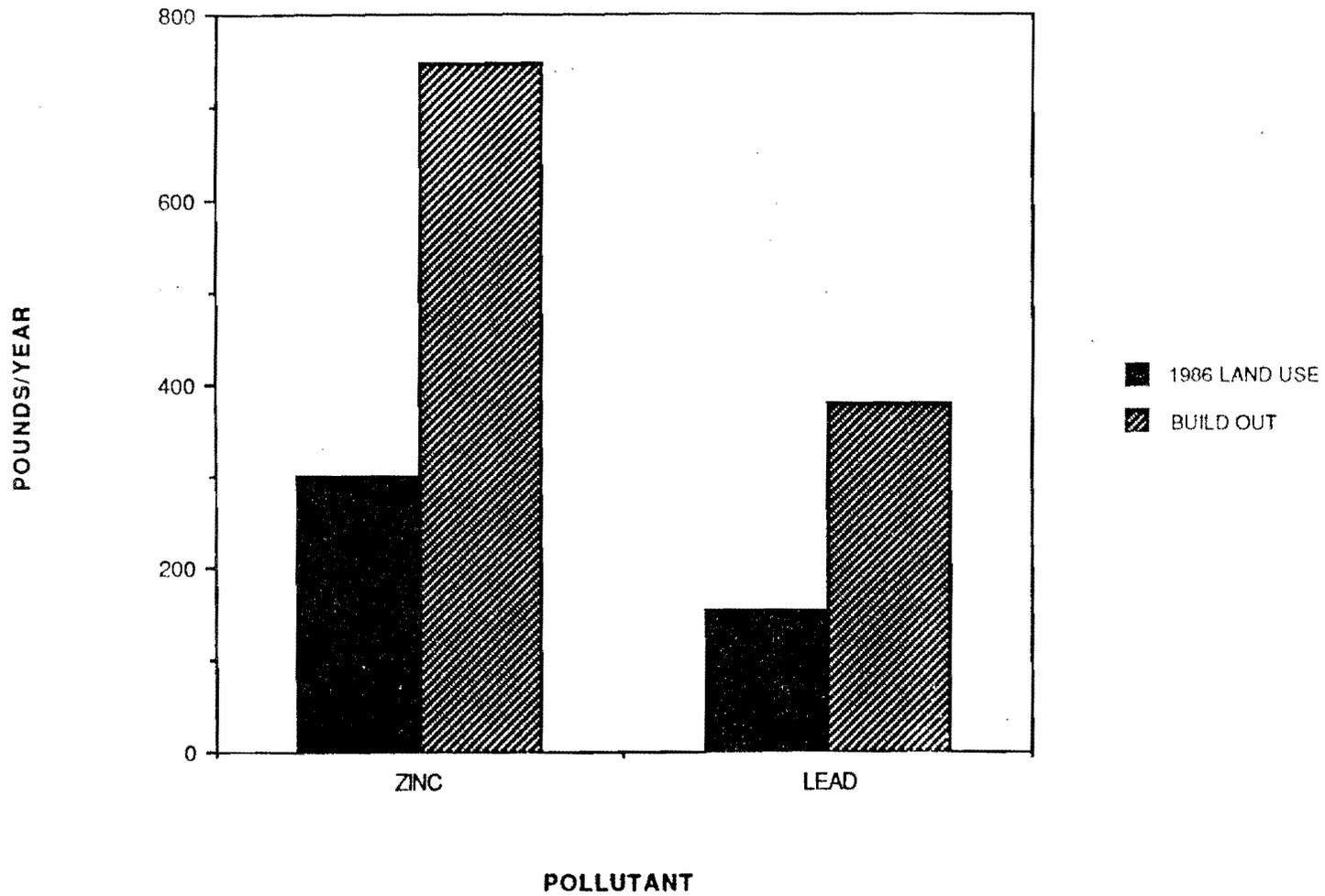
- ▨ RESIDENTIAL
- COMMERCIAL
- ▨ INDUSTRIAL



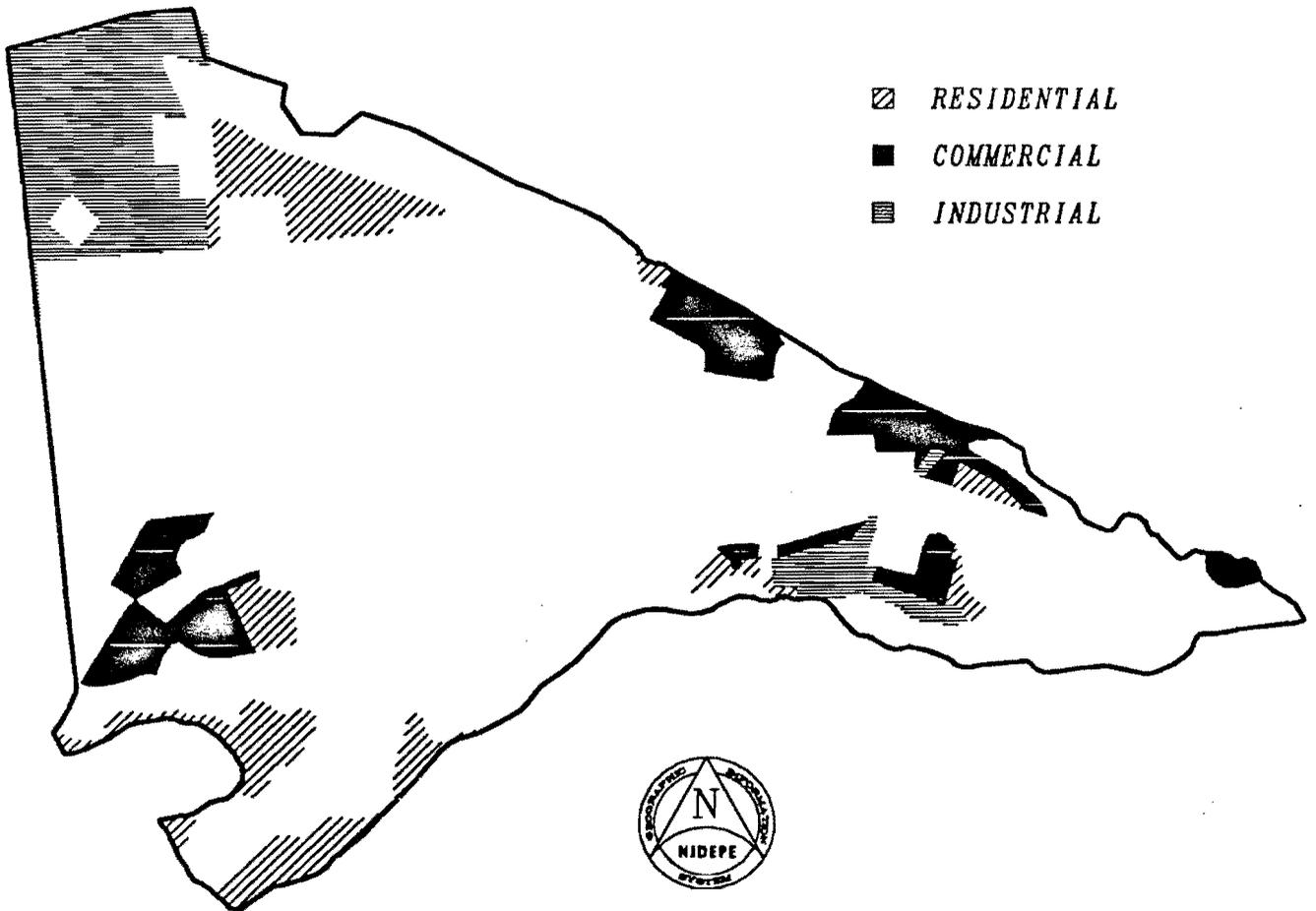
LACEY TOWNSHIP  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT



LACEY TOWNSHIP  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT

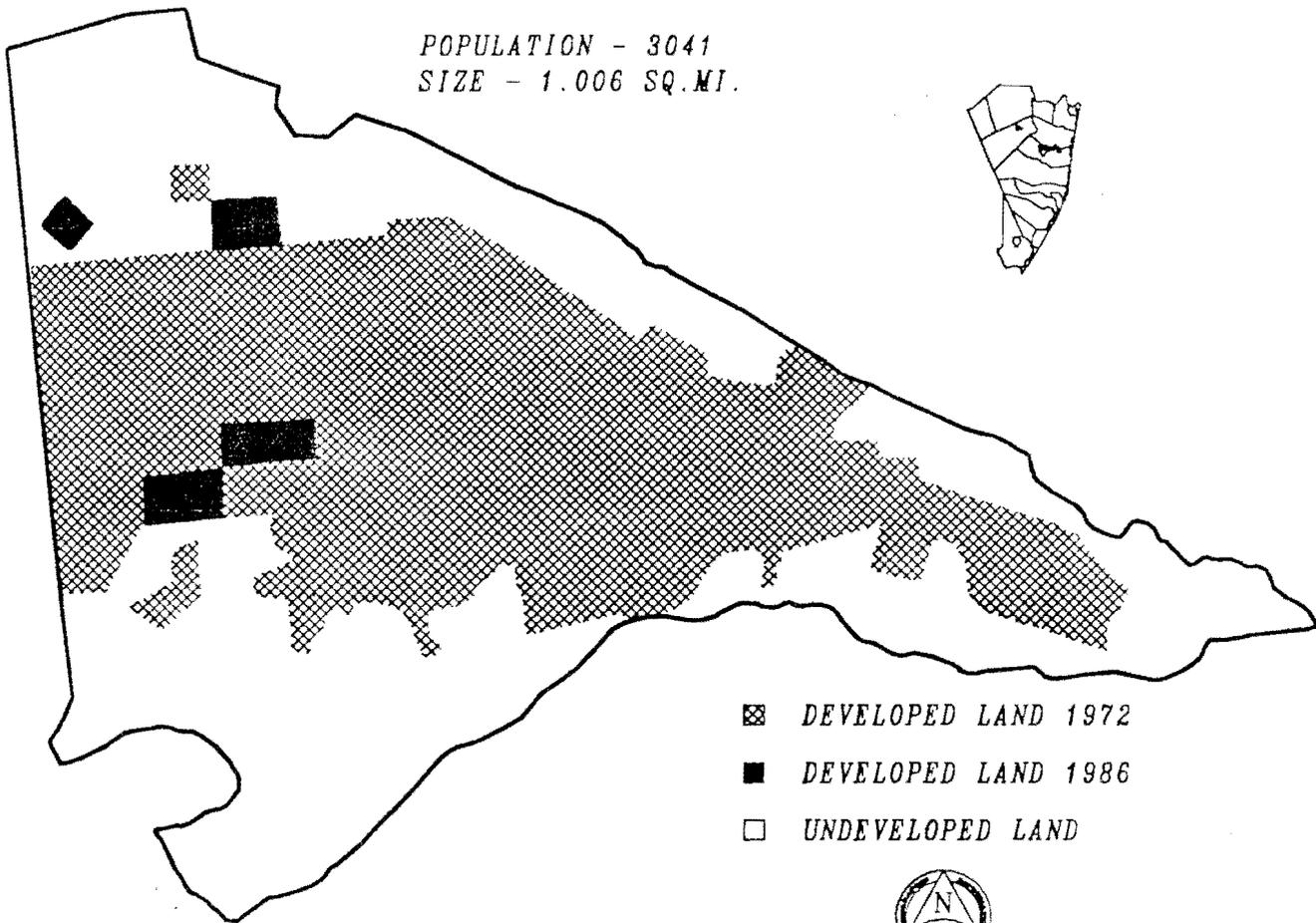


# ZONING FOR AVAILABLE LAND IN LAKEHURST BORO



# STAGES OF DEVELOPMENT IN LAKEHURST BORO

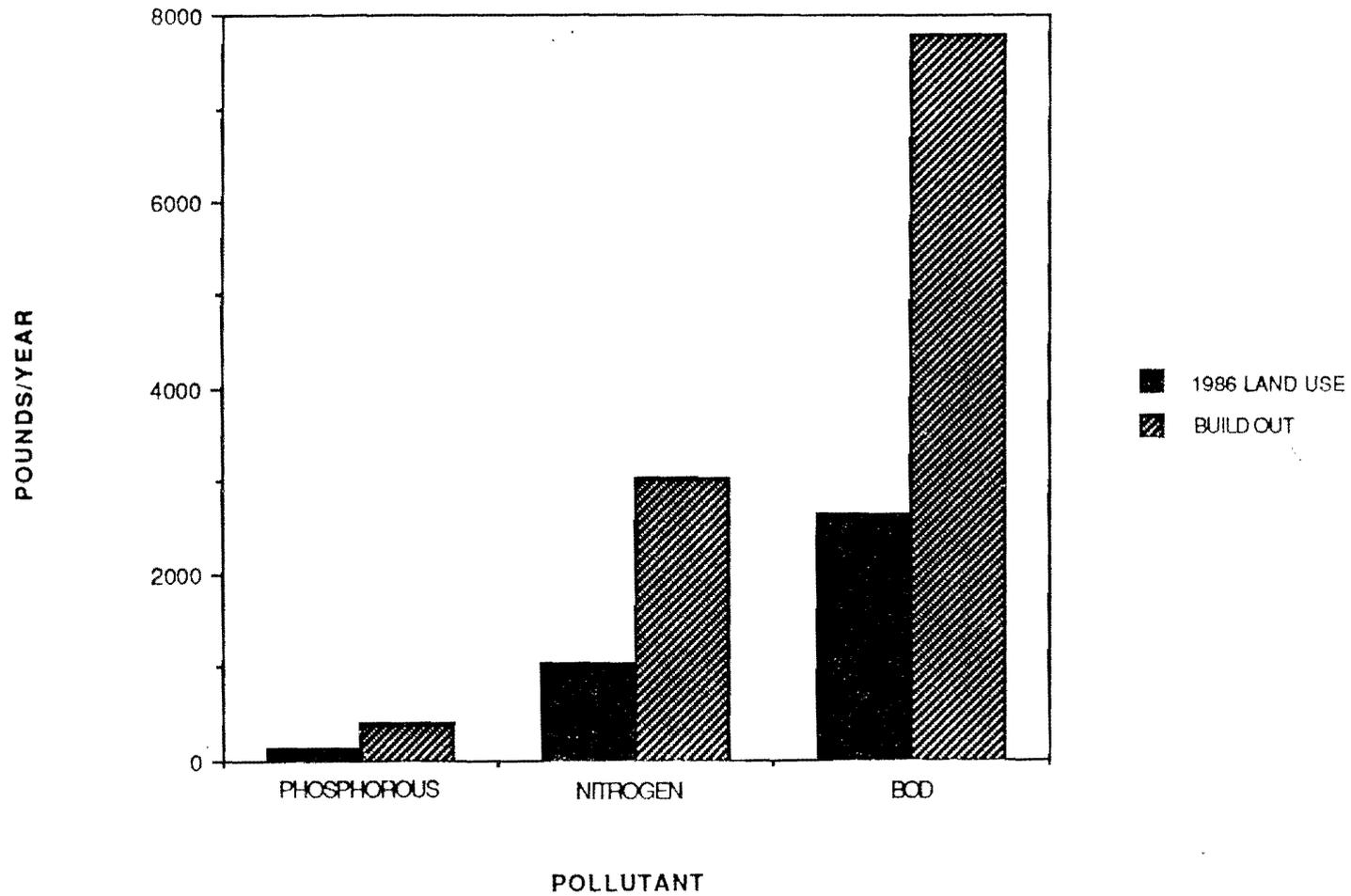
POPULATION - 3041  
SIZE - 1.006 SQ. MI.



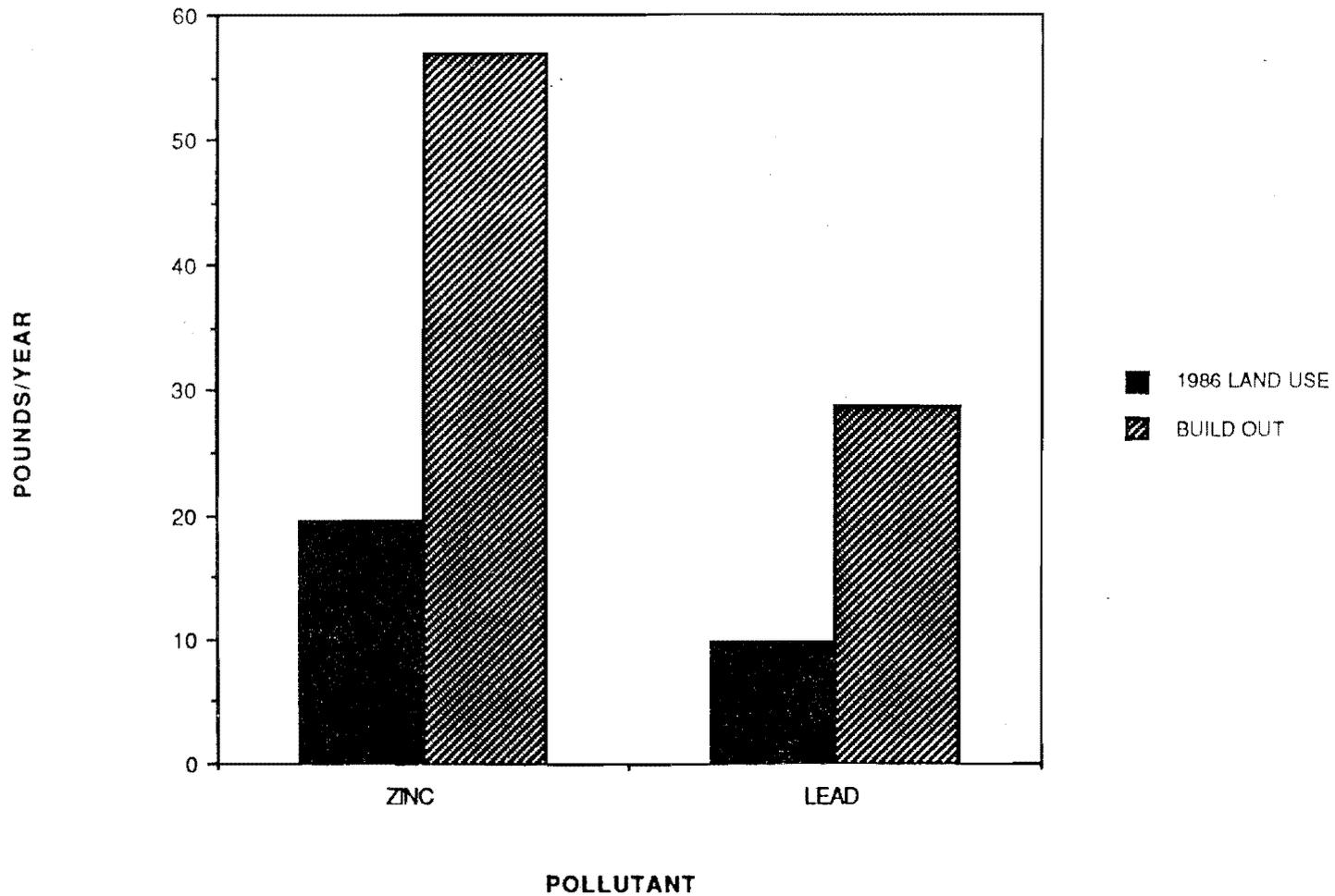
- ▣ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND



LAKEHURST BORO  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT

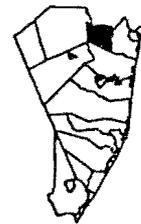


LAKEHURST BORO  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT

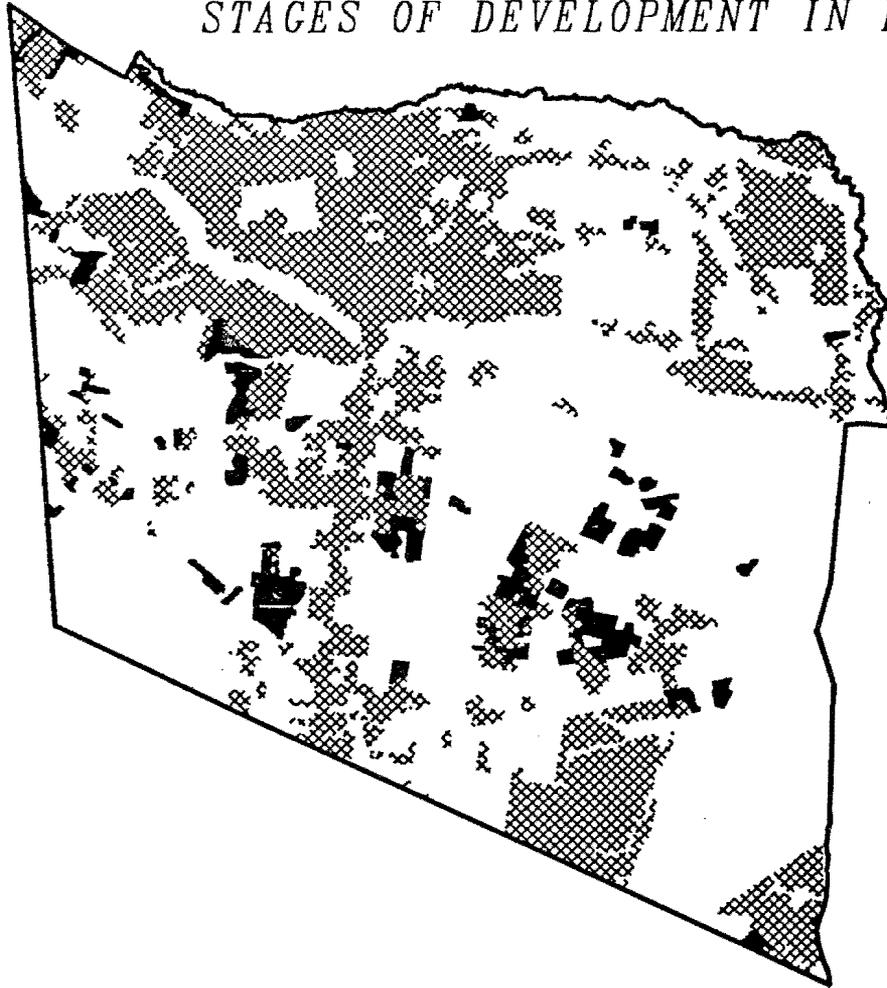


# STAGES OF DEVELOPMENT IN LAKEWOOD TWP

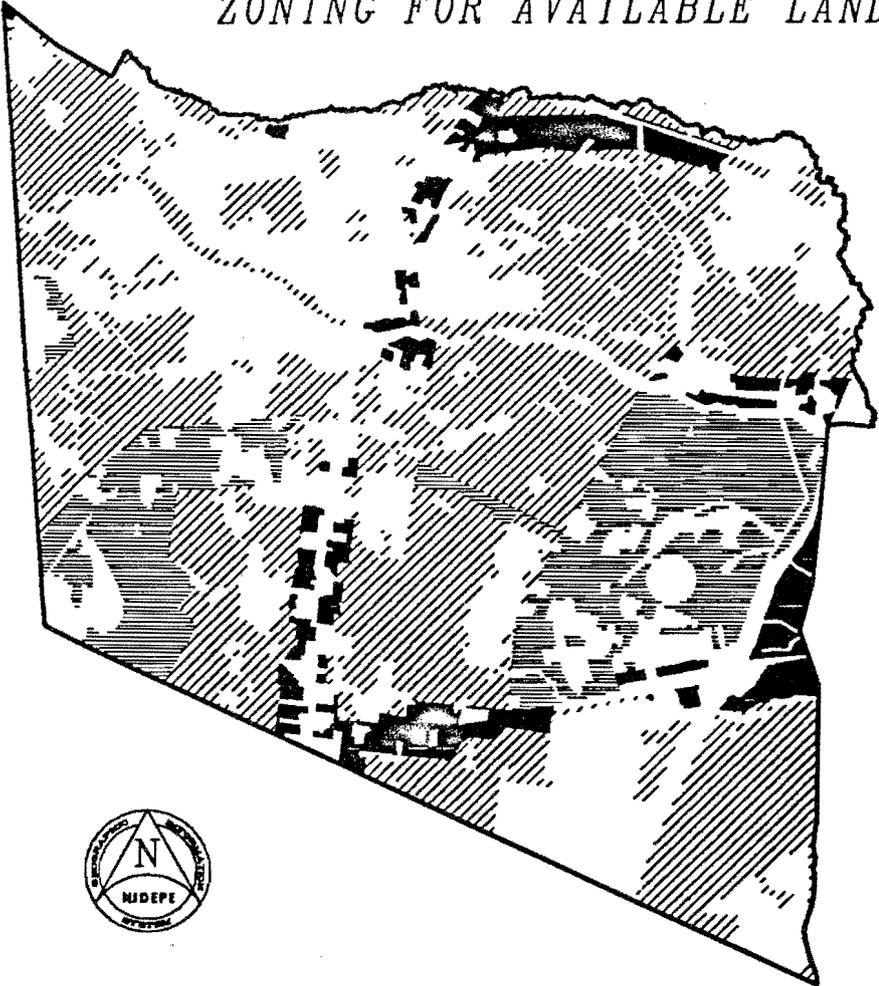
POPULATION - 44920  
SIZE - 25.05 SQ. MI.



- ▣ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND



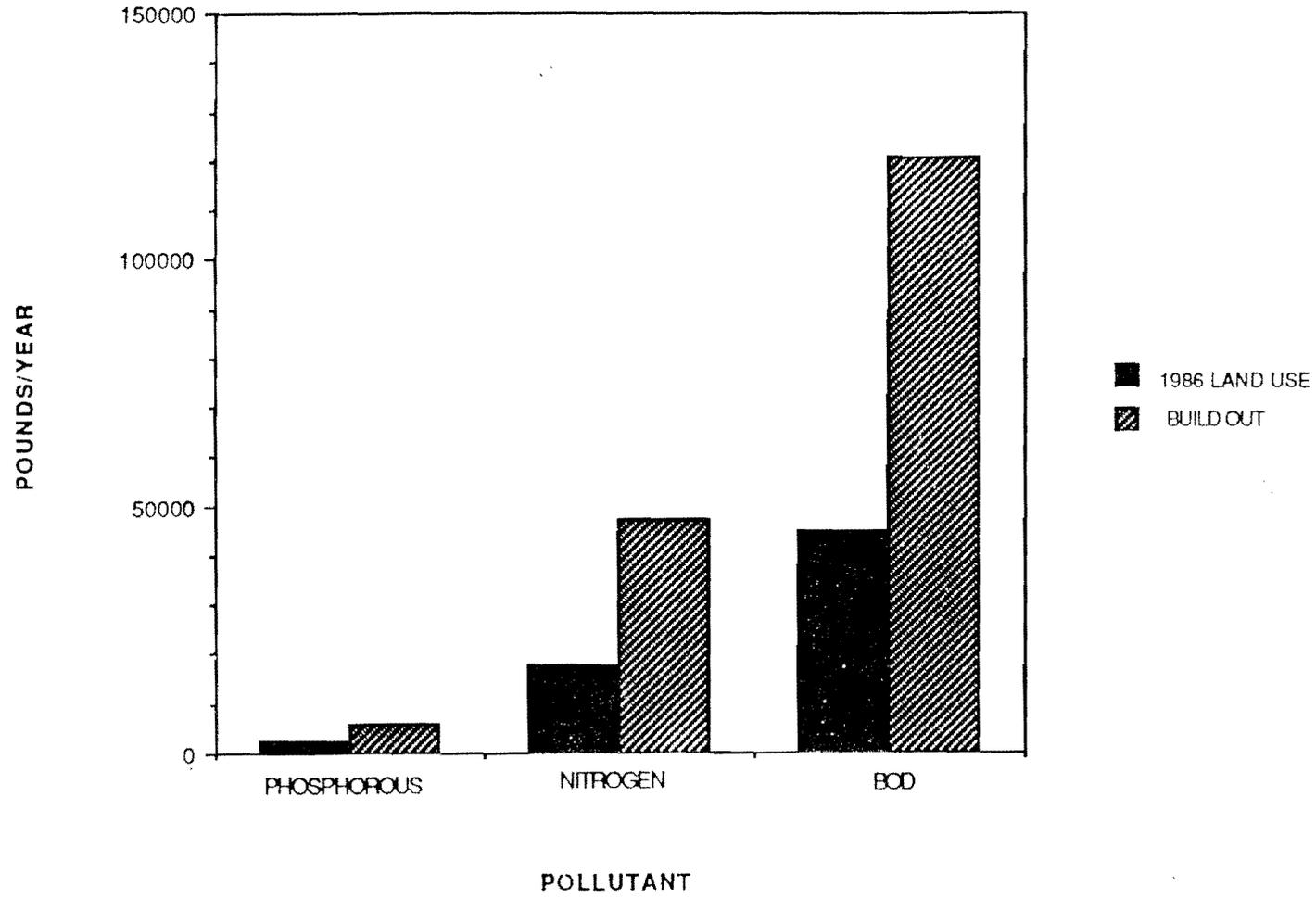
ZONING FOR AVAILABLE LAND IN LAKEWOOD TWP



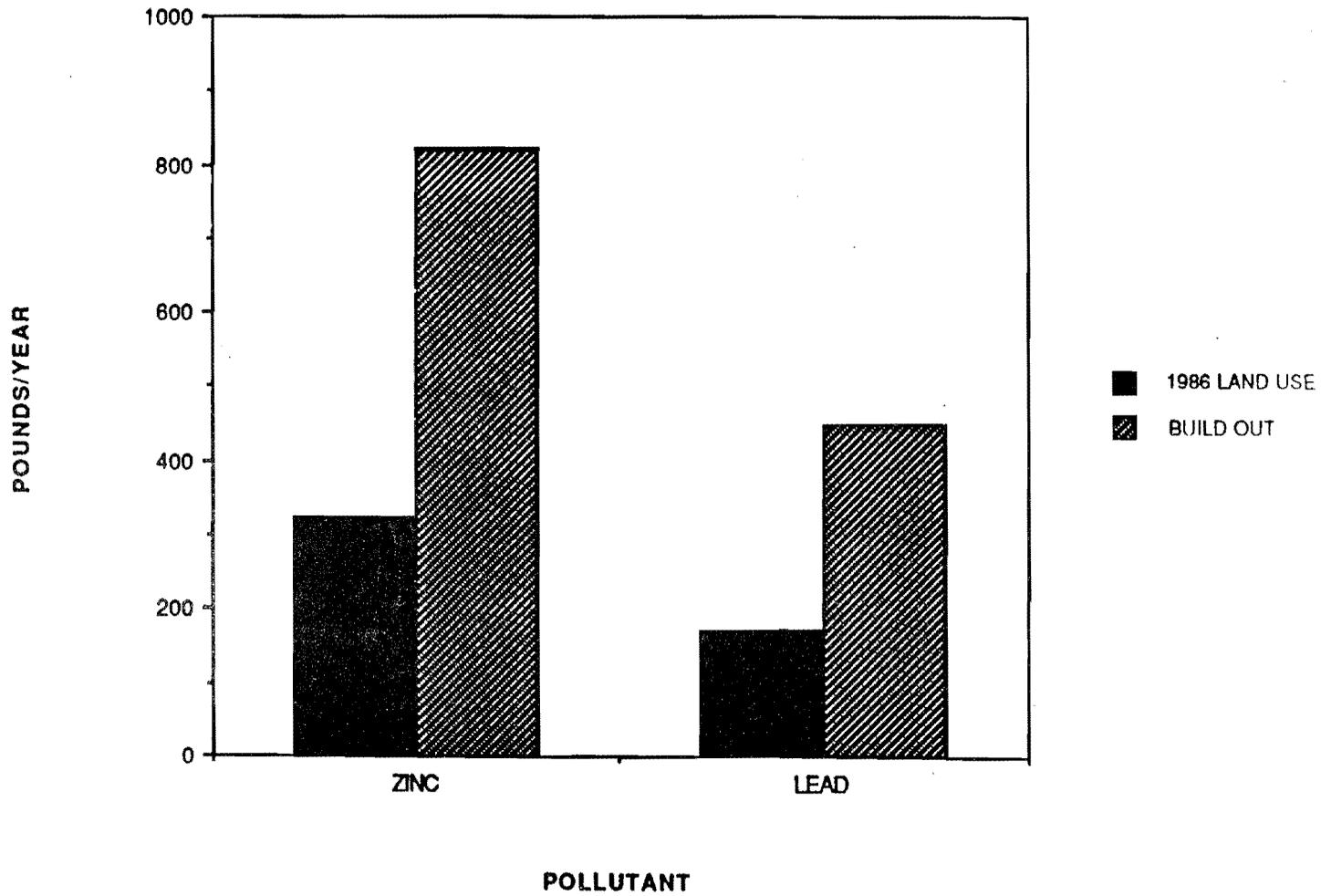
- ▨ RESIDENTIAL
- COMMERCIAL
- ▨ INDUSTRIAL



LAKESWOOD TOWNSHIP  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT

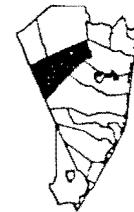
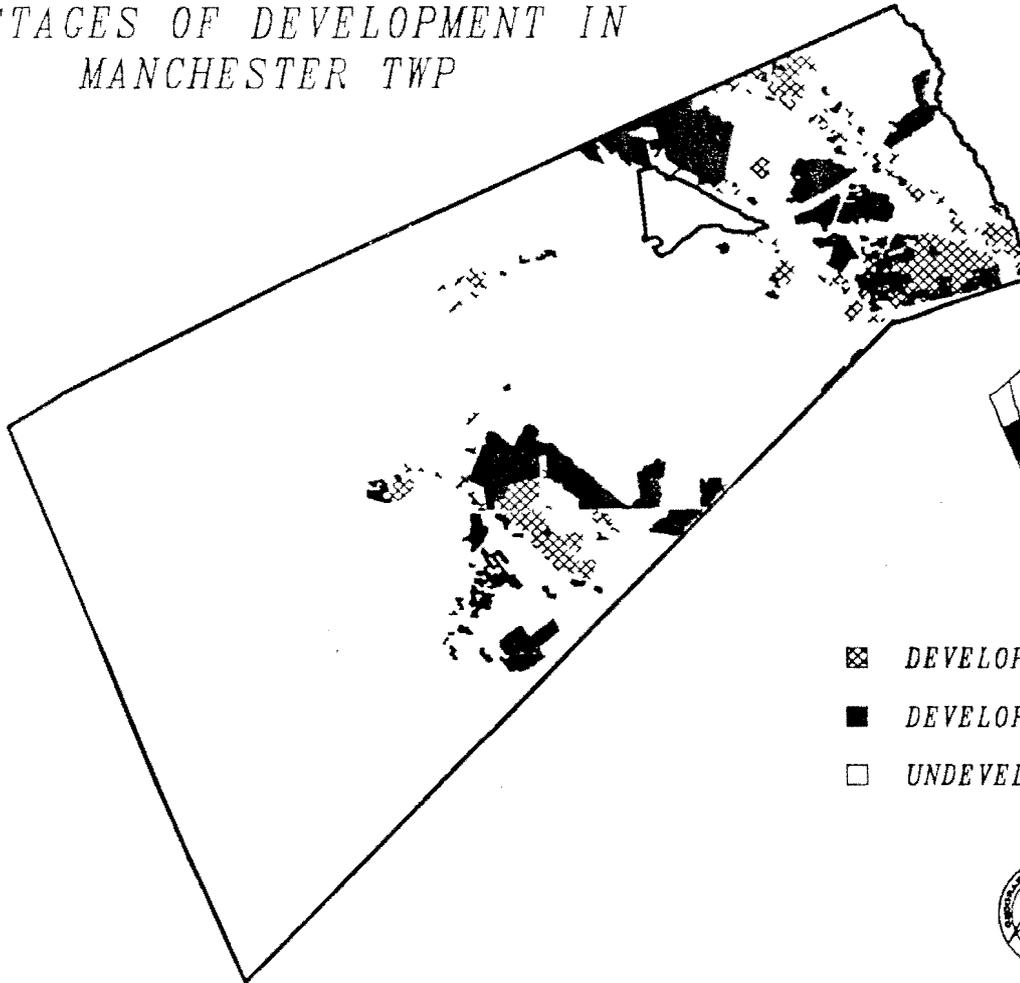


LAKWOOD TOWNSHIP  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT



STAGES OF DEVELOPMENT IN  
MANCHESTER TWP

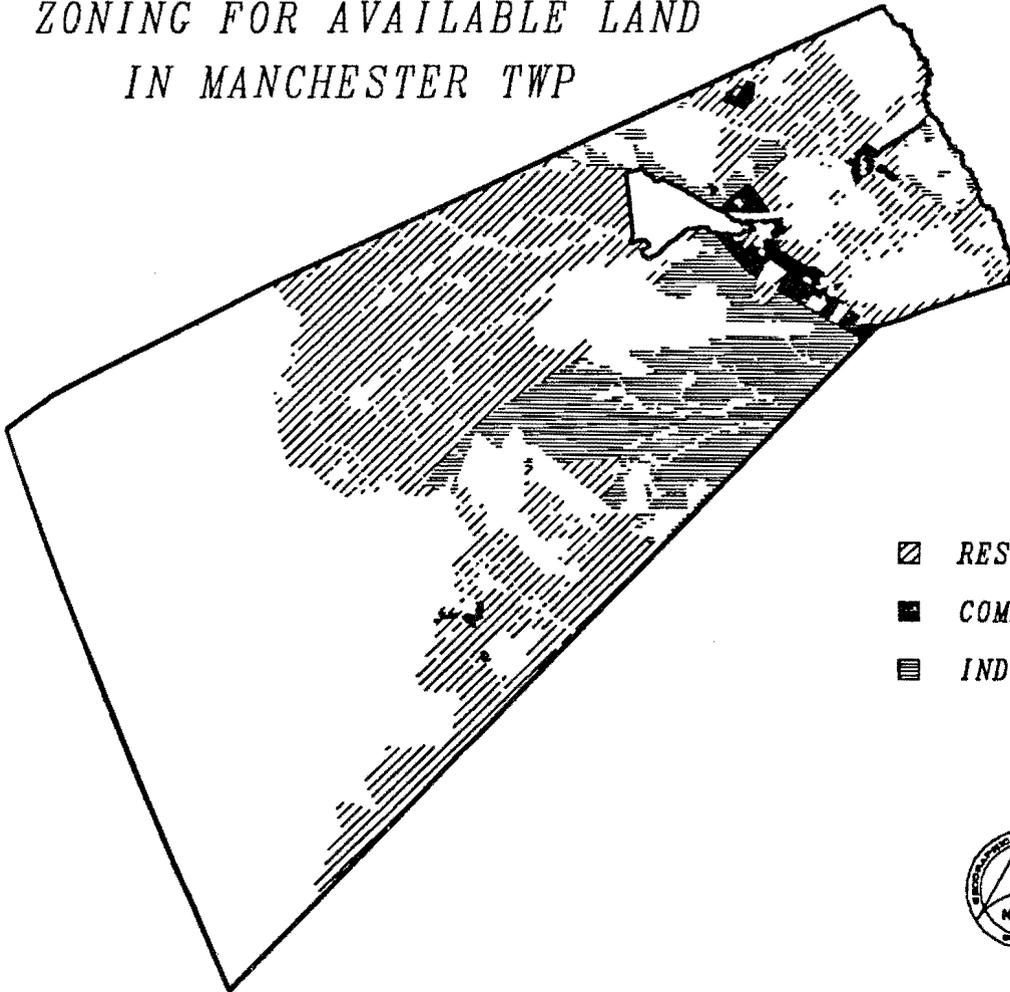
POPULATION - 35457  
SIZE - 82.702 SQ. MI.



- ▣ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND



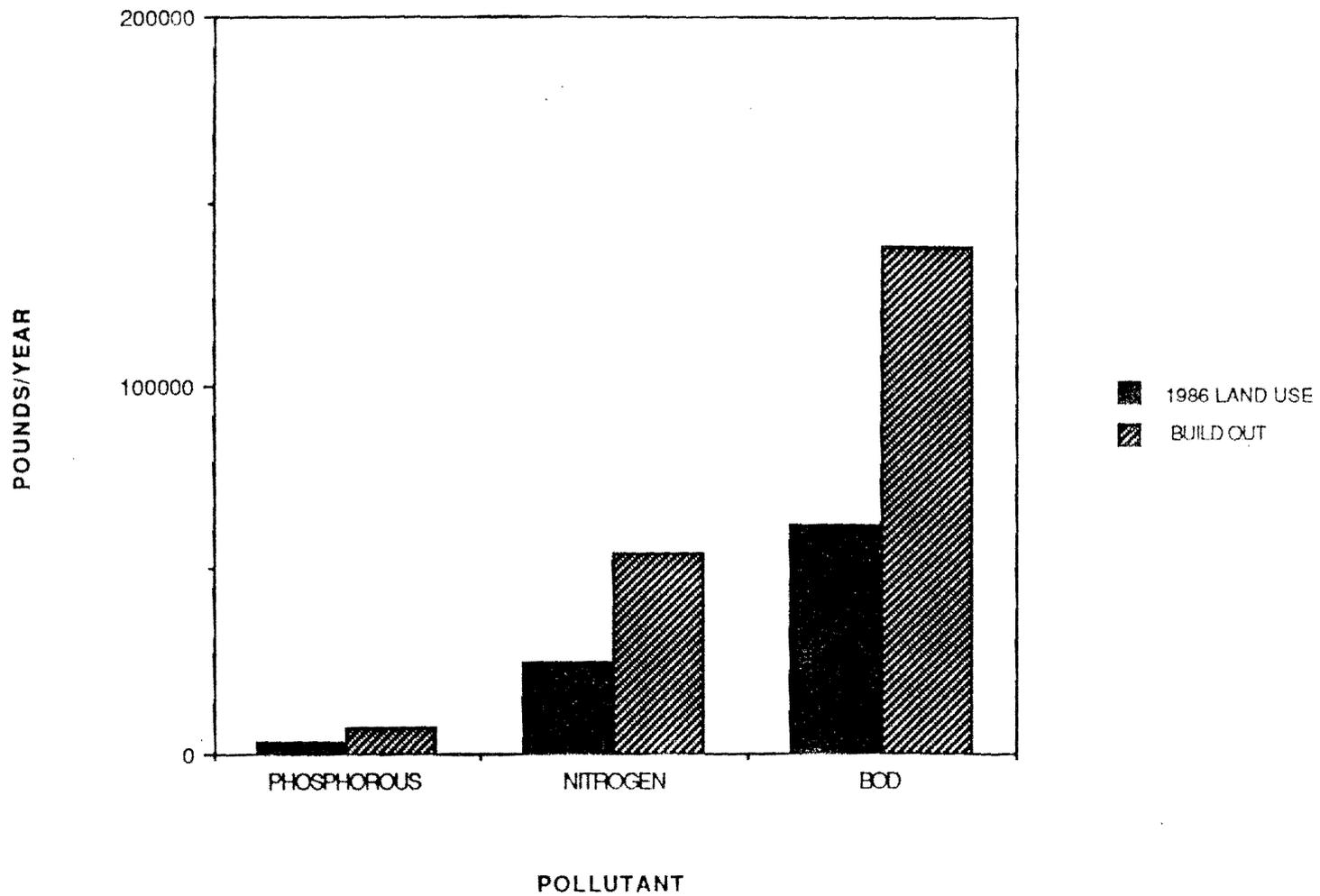
ZONING FOR AVAILABLE LAND  
IN MANCHESTER TWP



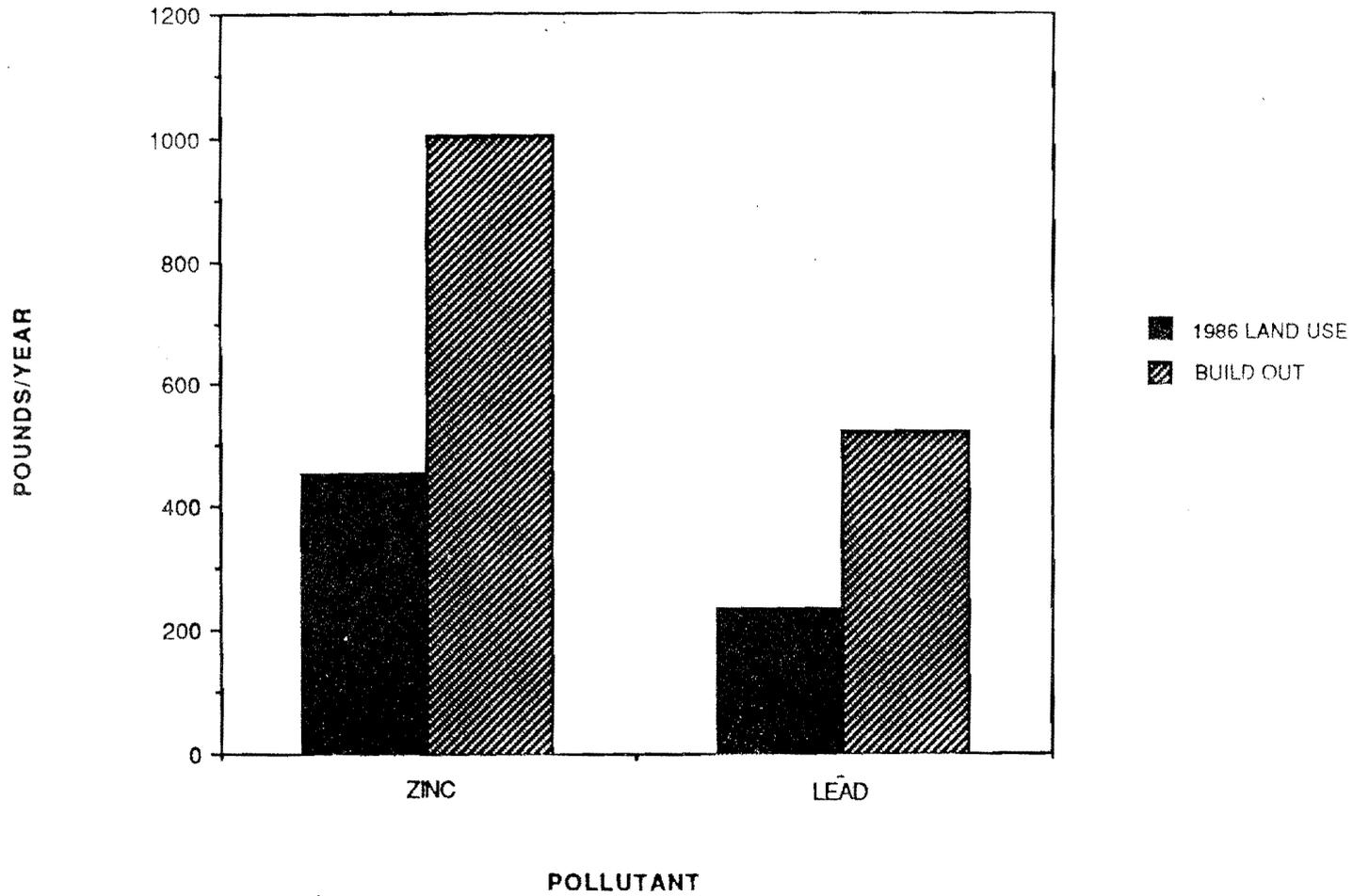
- ▨ RESIDENTIAL
- COMMERCIAL
- ▨ INDUSTRIAL



MANCHESTER TOWNSHIP  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT



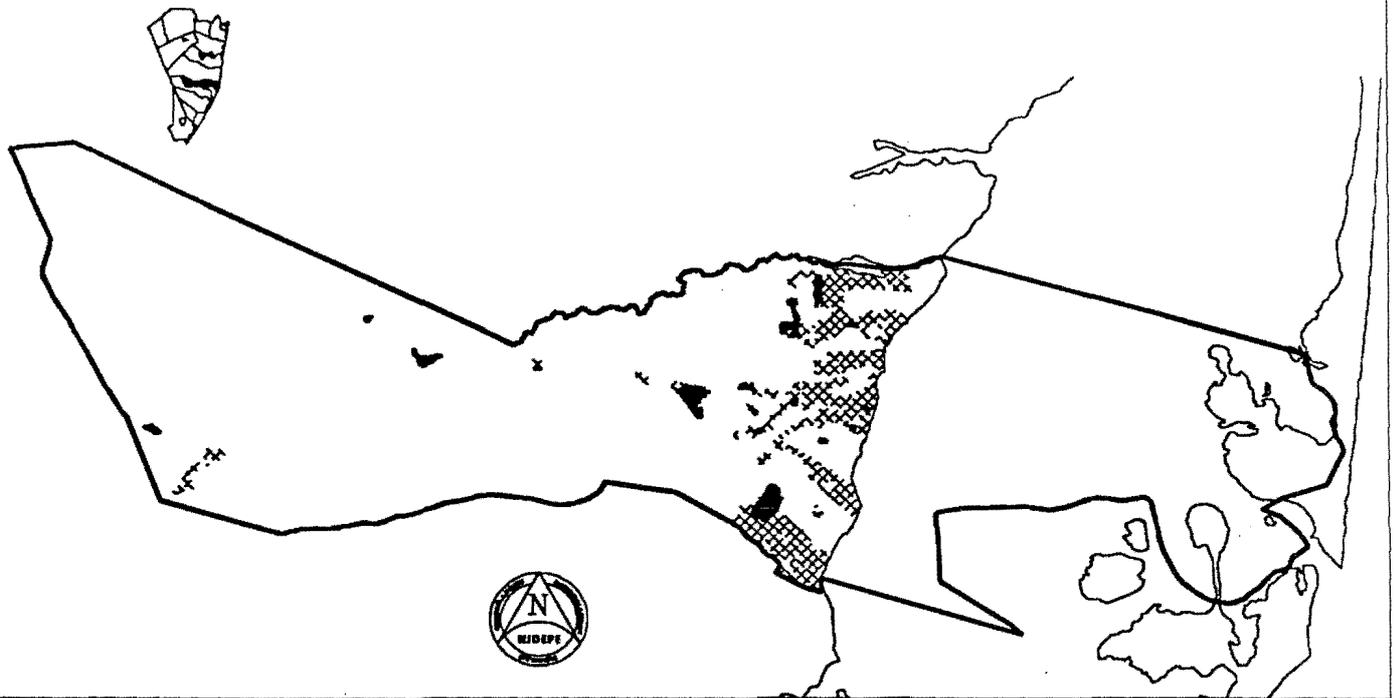
MANCHESTER TOWNSHIP  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT



# STAGES OF DEVELOPMENT IN OCEAN TWP

- ☒ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND

POPULATION - 5378  
SIZE - 32.451 SQ. MI.

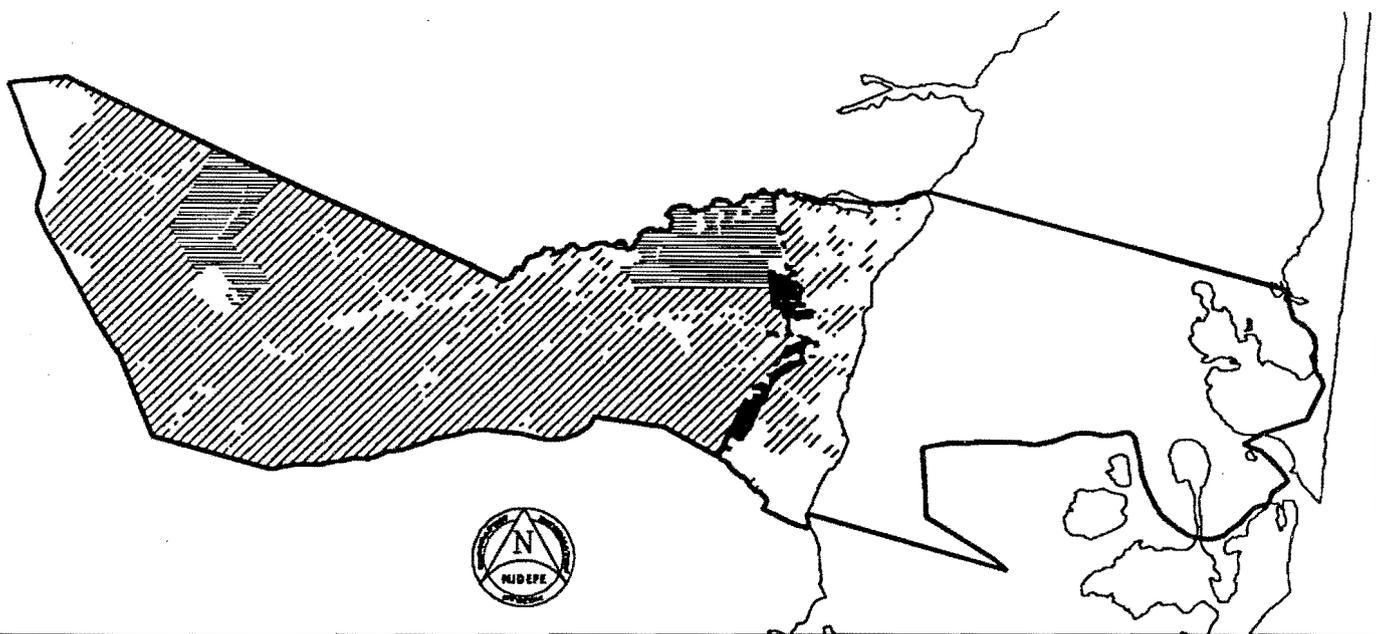


# ZONING FOR AVAILABLE LAND IN OCEAN TWP

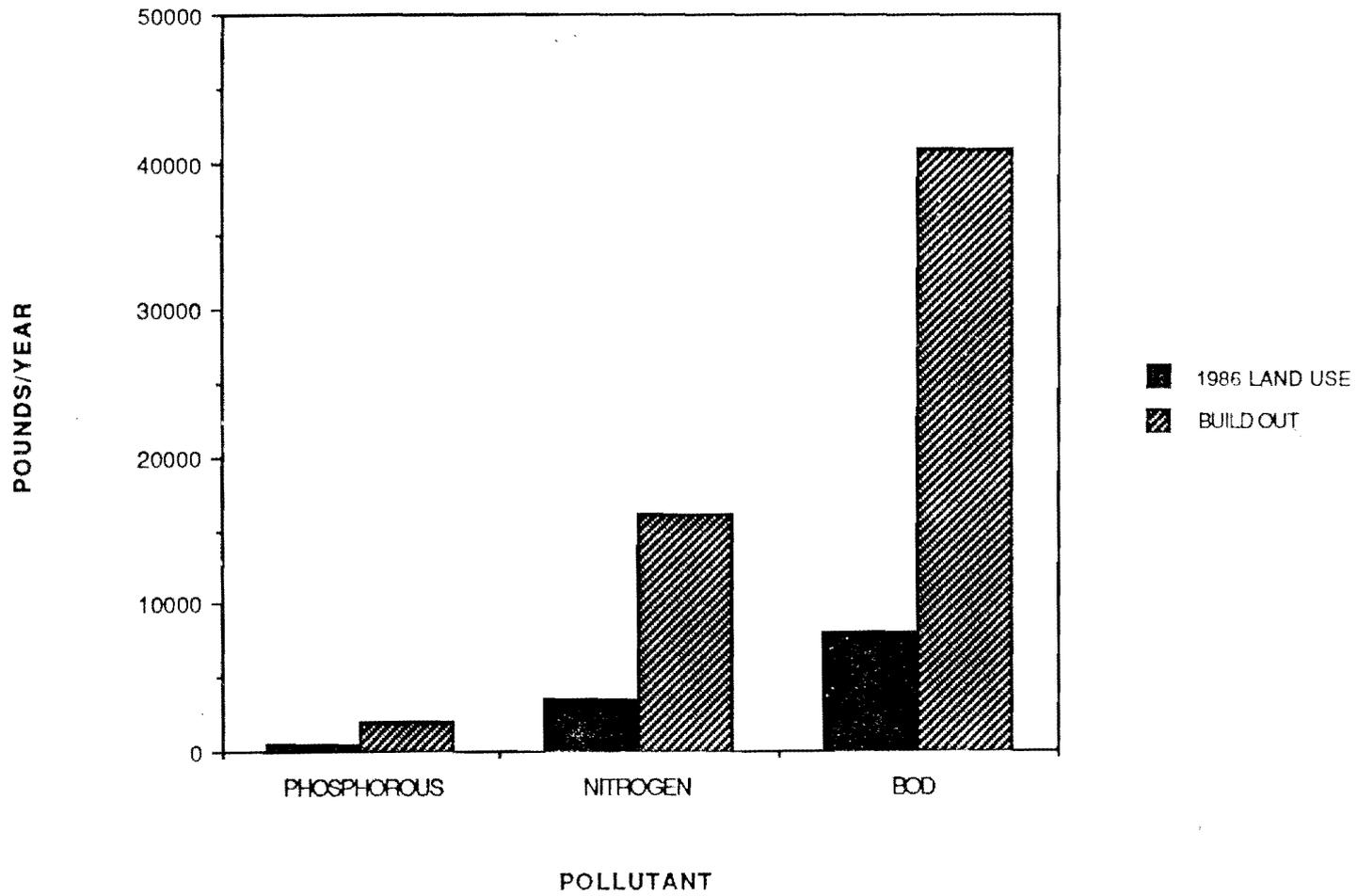
▨ RESIDENTIAL

■ COMMERCIAL

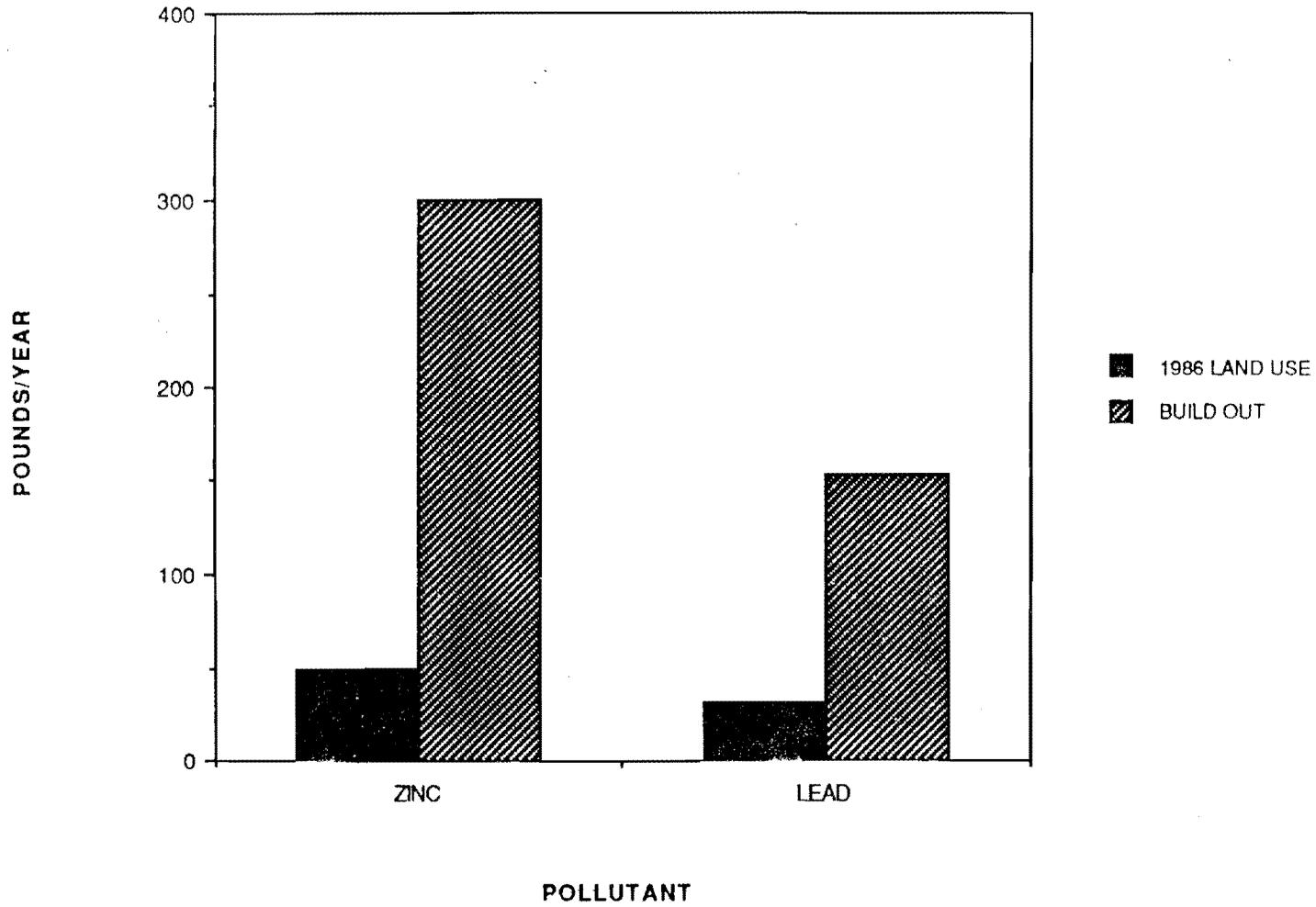
▨ INDUSTRIAL



OCEAN TOWNSHIP  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT



OCEAN TOWNSHIP  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT

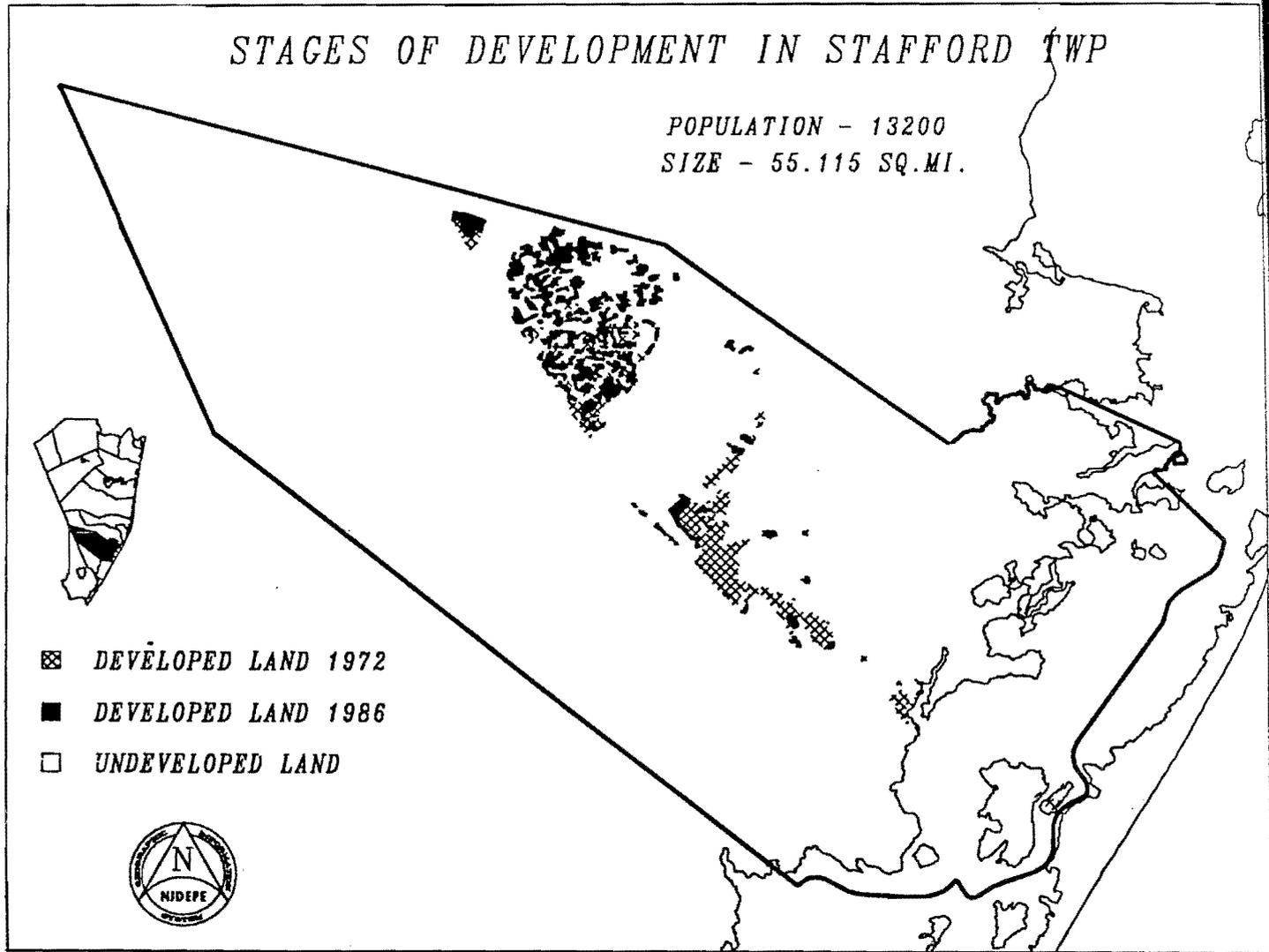


# STAGES OF DEVELOPMENT IN STAFFORD TWP

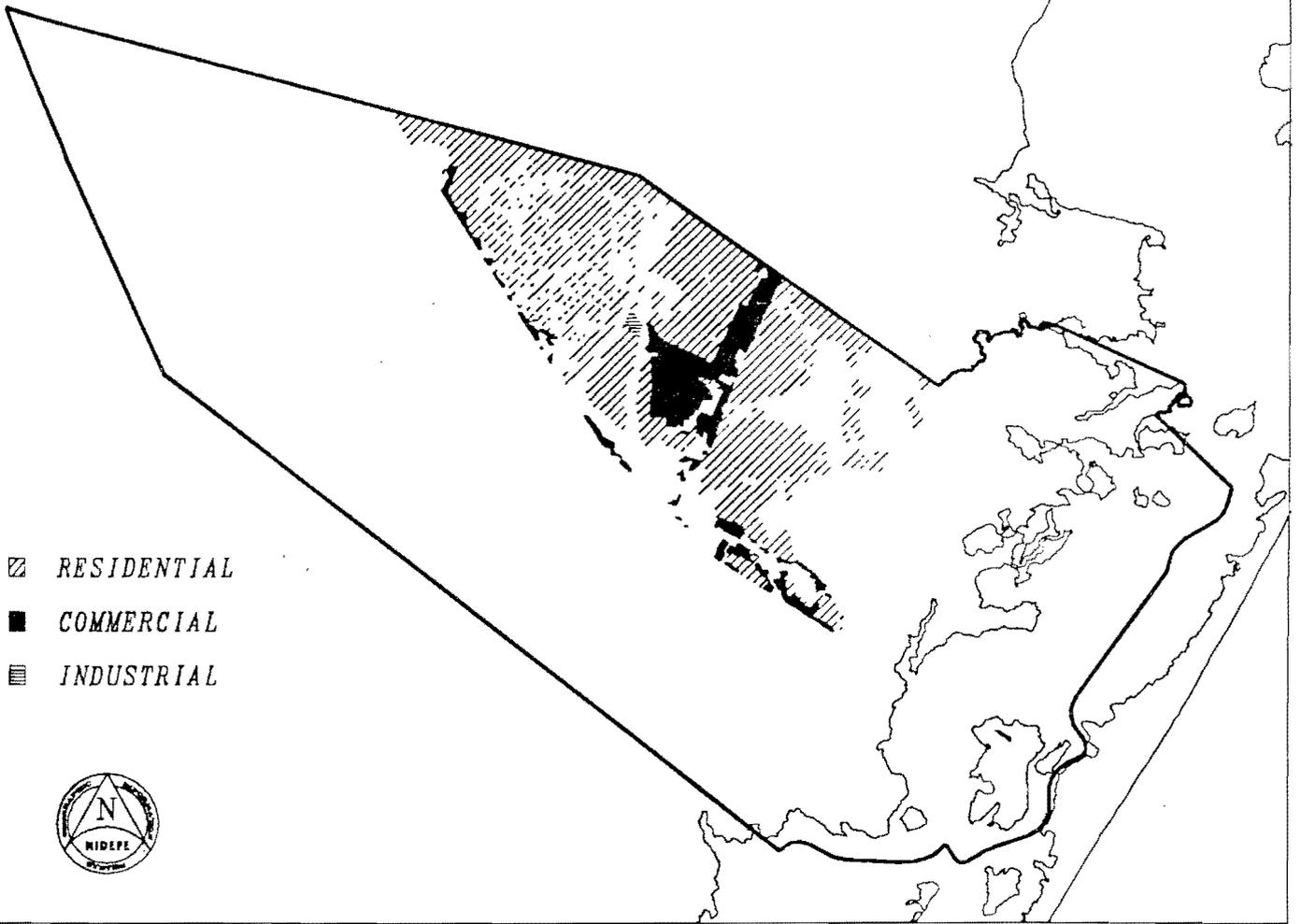
POPULATION - 13200  
SIZE - 55.115 SQ.MI.



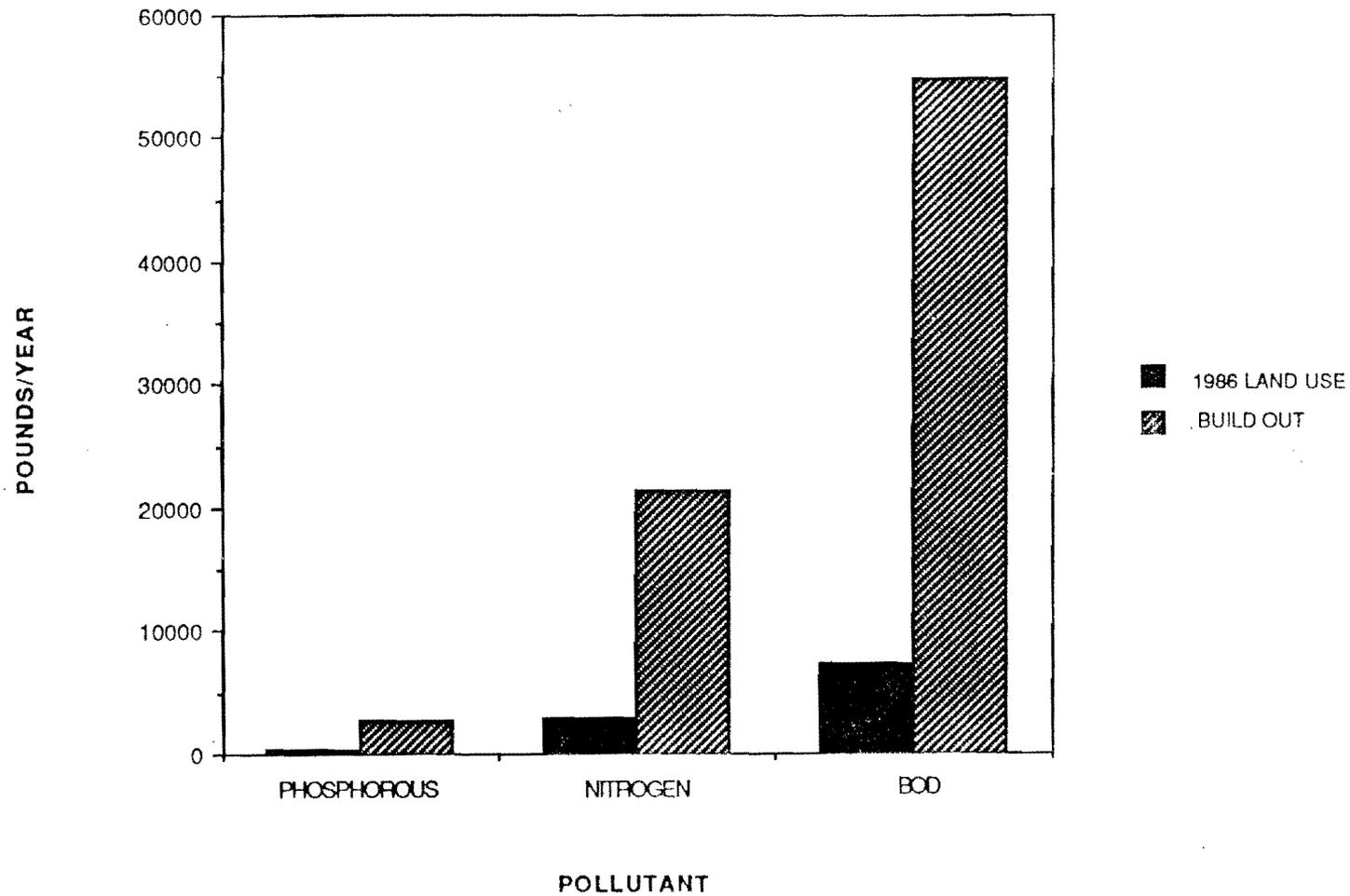
- ▣ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND



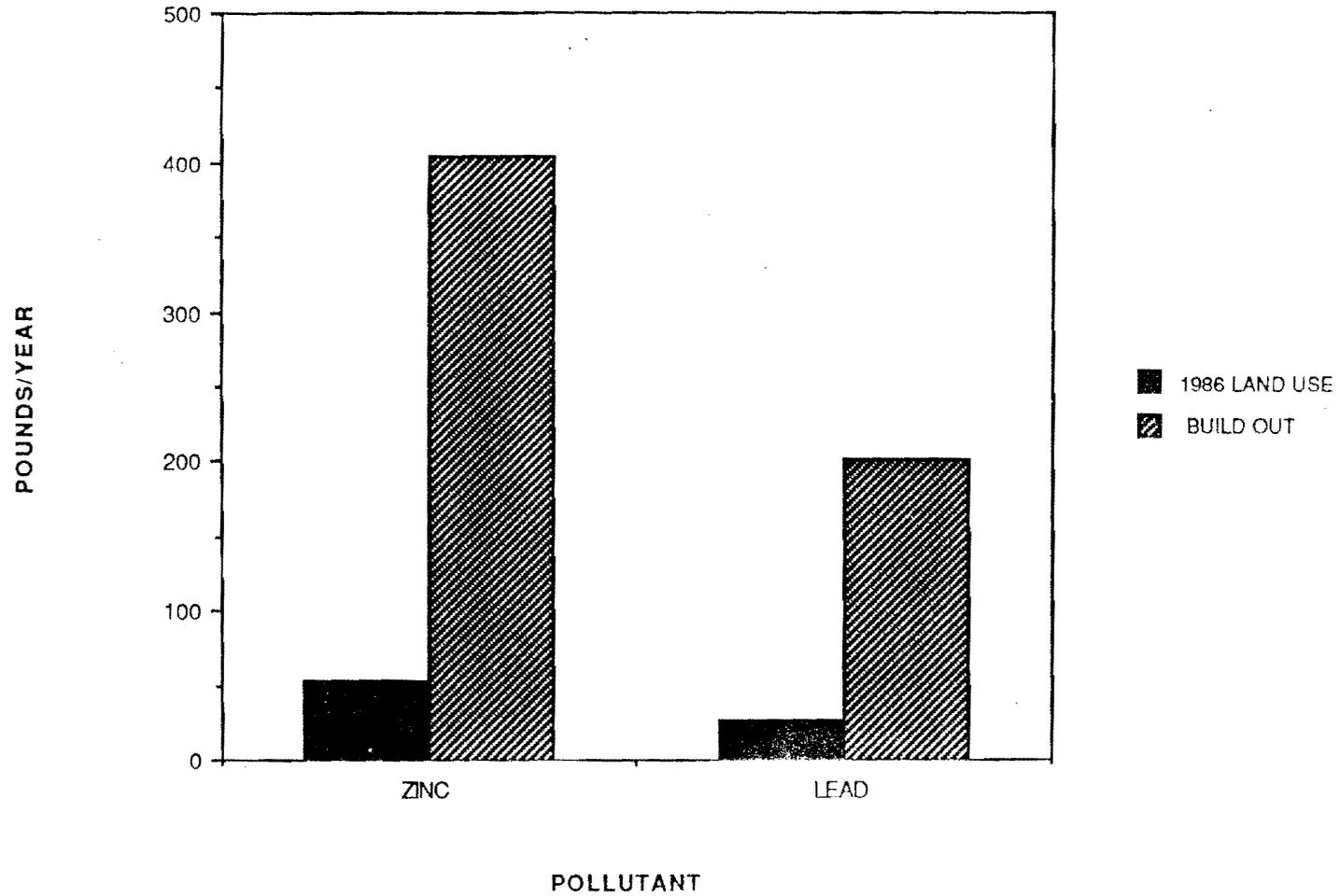
ZONING FOR AVAILABLE LAND IN STAFFORD TWP



STAFFORD TOWNSHIP  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT



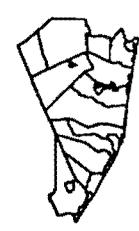
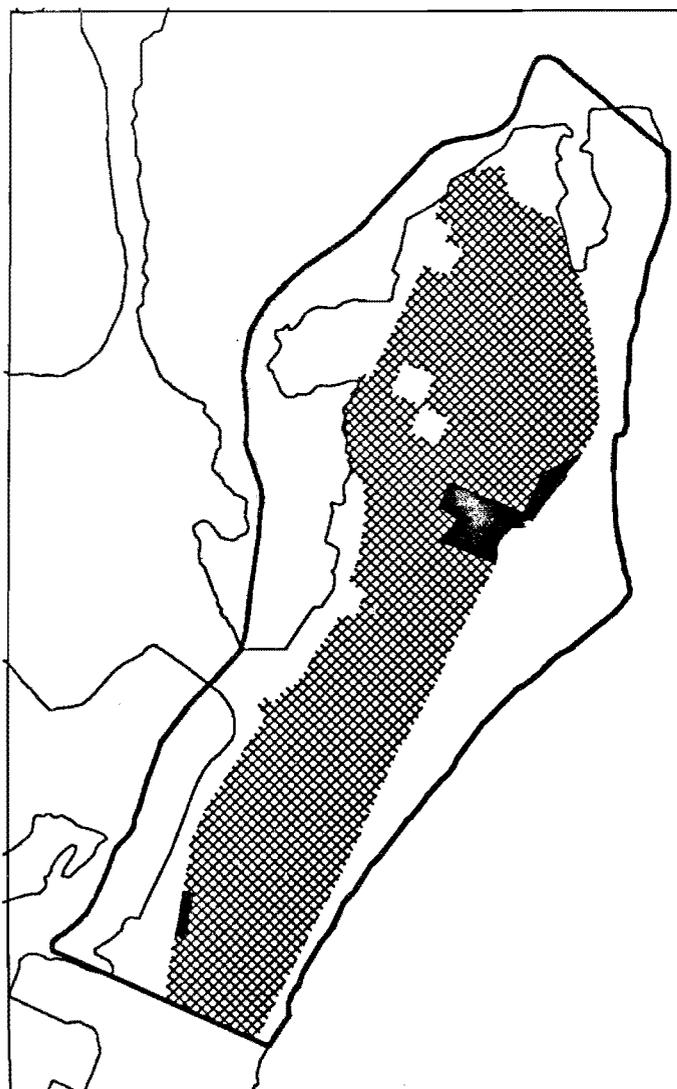
STAFFORD TOWNSHIP  
POLLUTANTS FROM STORMWATER RUNOFF  
1986 LAND USE VS. BUILD OUT



**RESULTS FOR MUNICIPALITIES WITHIN THE BARNEGAT BAY  
STUDY AREA THAT ARE TOTALLY DEVELOPED**

# STAGES OF DEVELOPMENT IN BARNEGAT LIGHT BORO

POPULATION - 646  
SIZE - 1.003 SQ. MI.

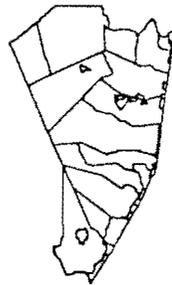


- ▣ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND

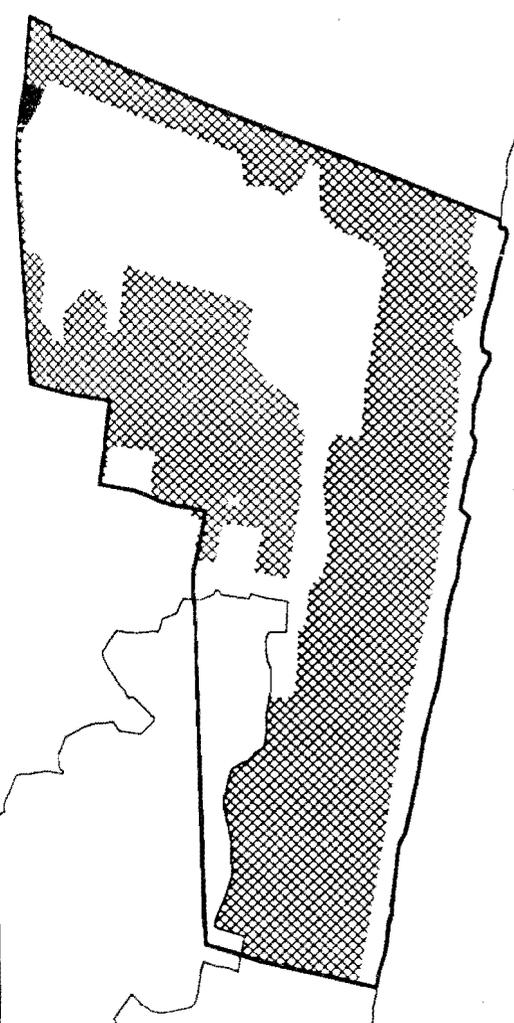


# STAGES OF DEVELOPMENT IN BAY HEAD BORO

POPULATION - 1197  
SIZE - 0.697 SQ. MI.

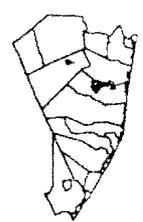
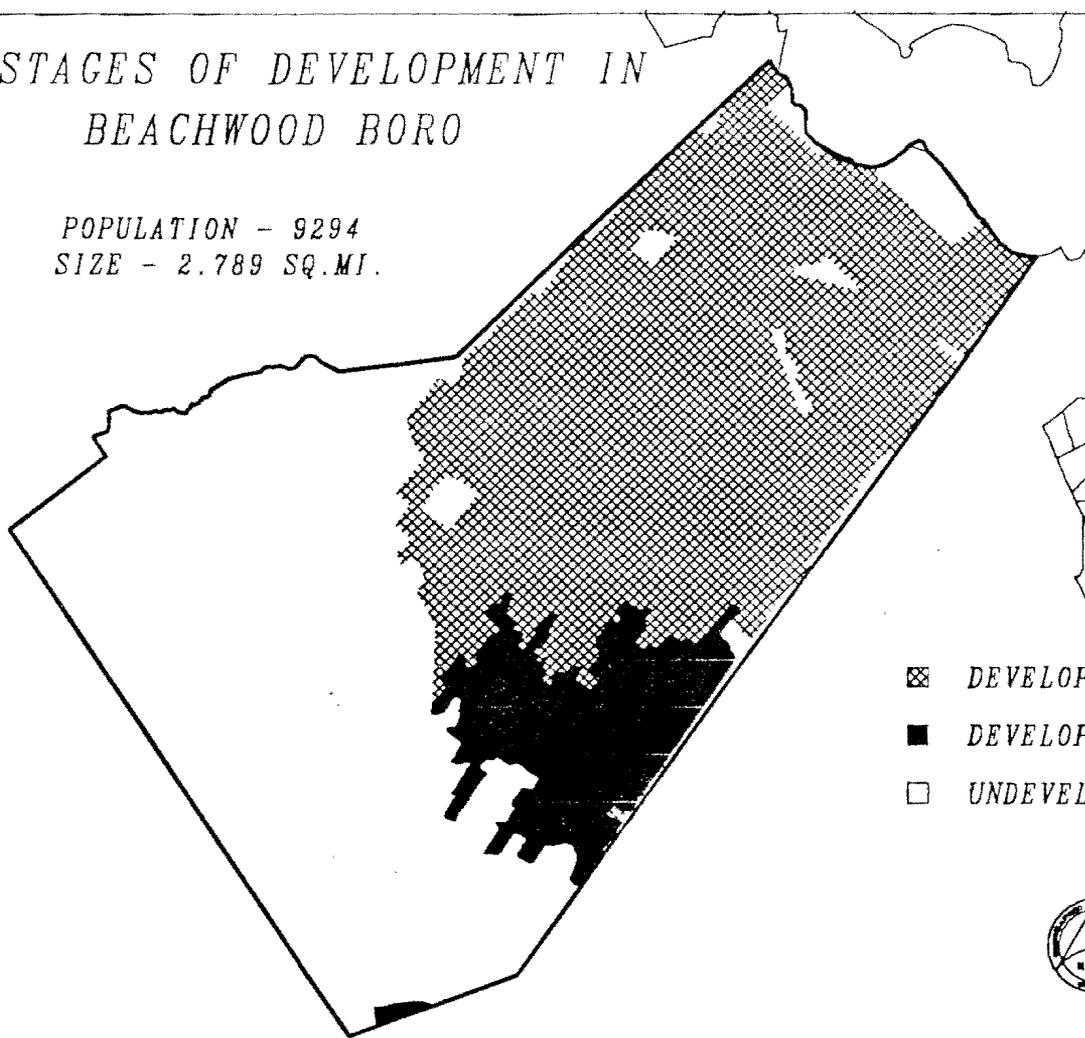


- ▣ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND



STAGES OF DEVELOPMENT IN  
BEACHWOOD BORO

POPULATION - 9294  
SIZE - 2.789 SQ. MI.



- ☒ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND



STAGES OF DEVELOPMENT  
IN HARVEY CEDARS

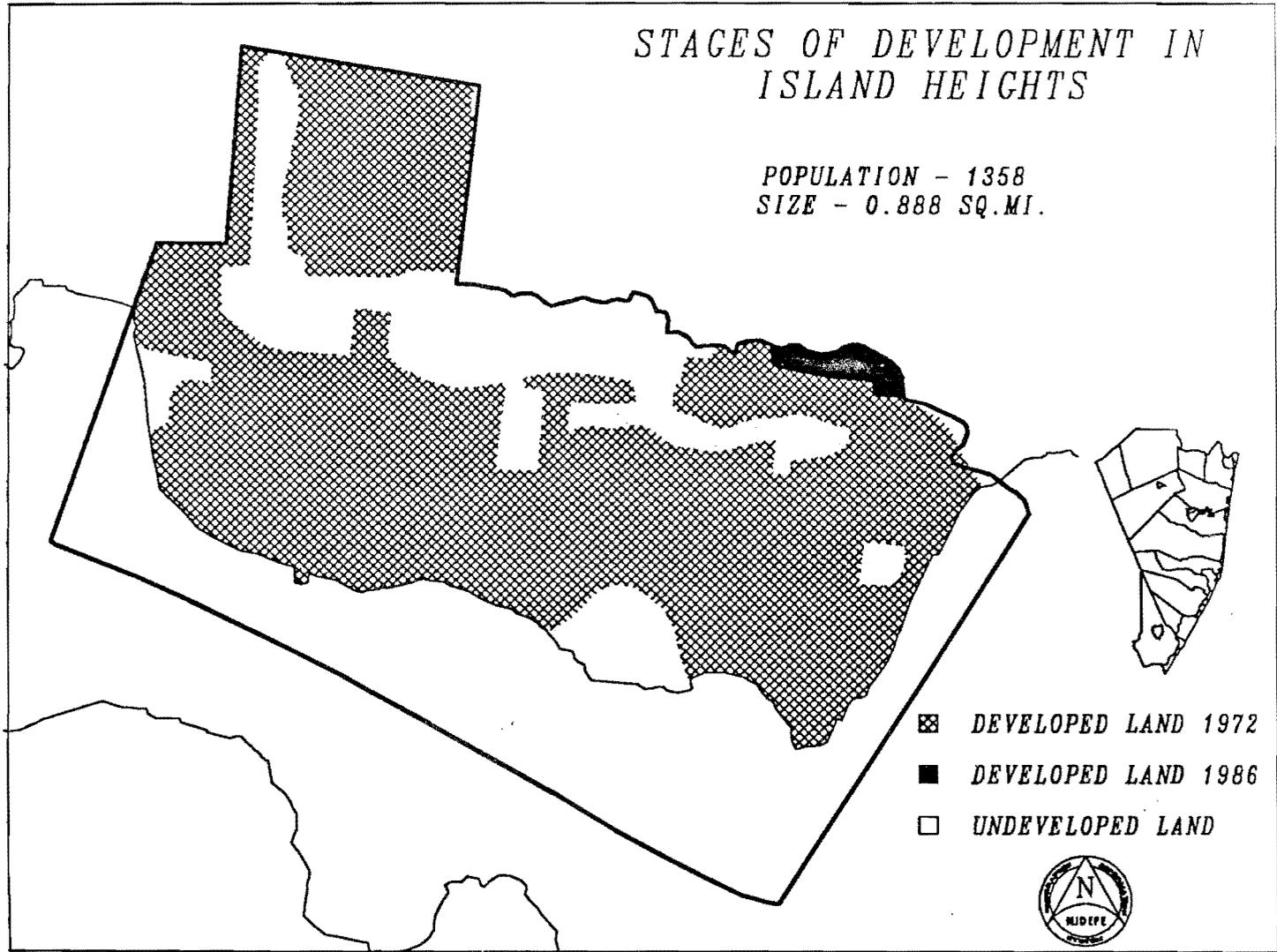


- ▣ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND



# STAGES OF DEVELOPMENT IN ISLAND HEIGHTS

POPULATION - 1358  
SIZE - 0.888 SQ.MI.

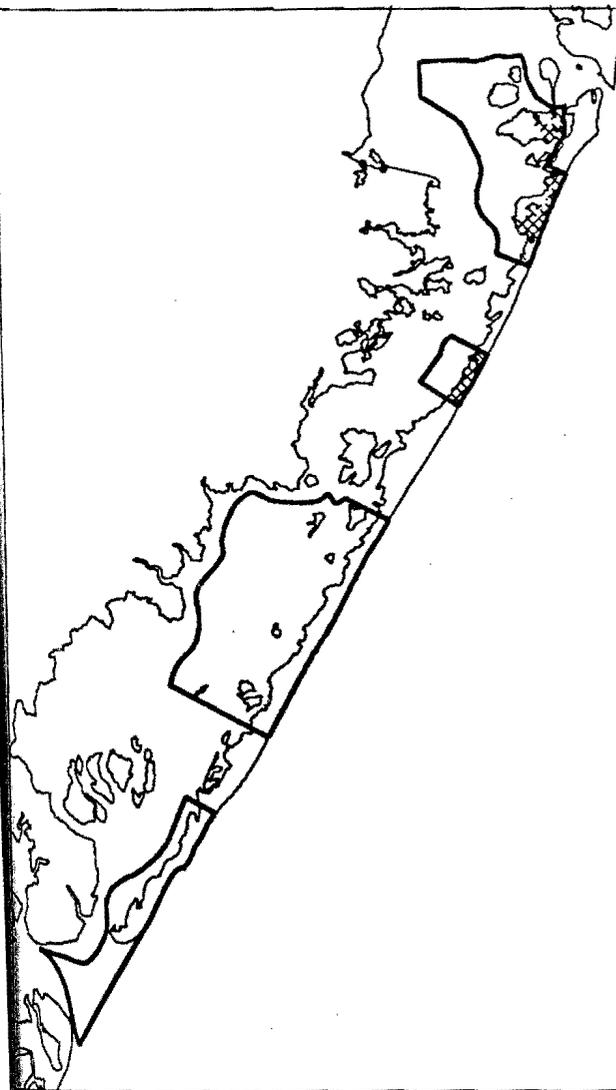


- ☒ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND



# STAGES OF DEVELOPMENT IN LONG BEACH TWP

POPULATION - 3269  
SIZE - 24.893 SQ.MI.



- ▣ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND

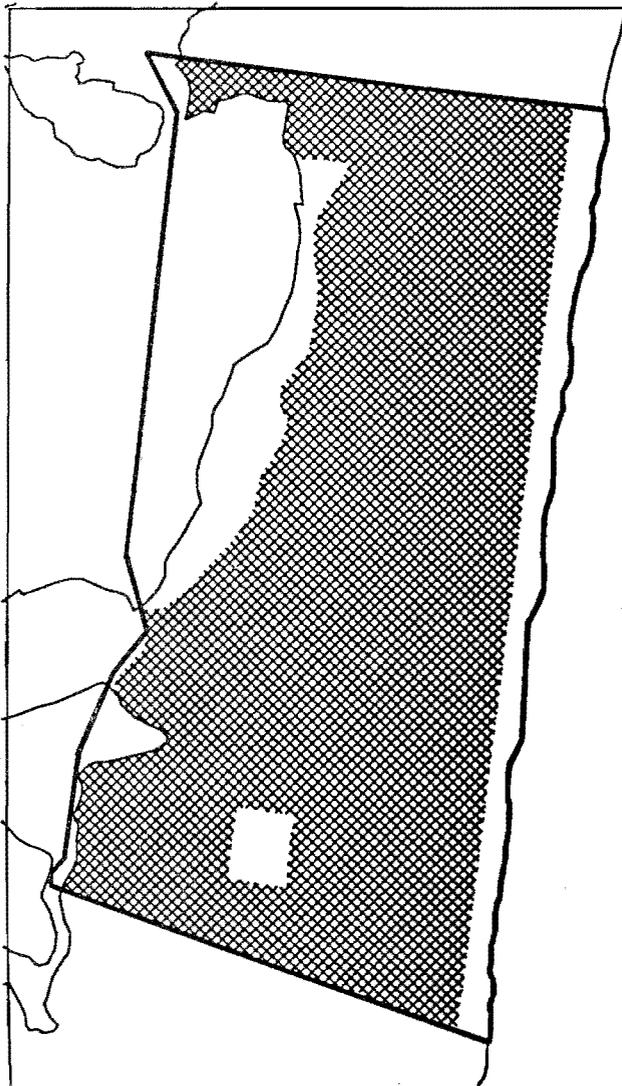


# STAGES OF DEVELOPMENT IN LAVALLETTE BORO

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SIZE - 0.707 SQ. MI.

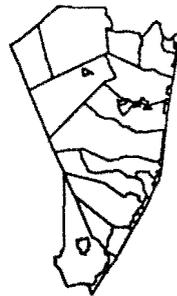


- ▣ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND

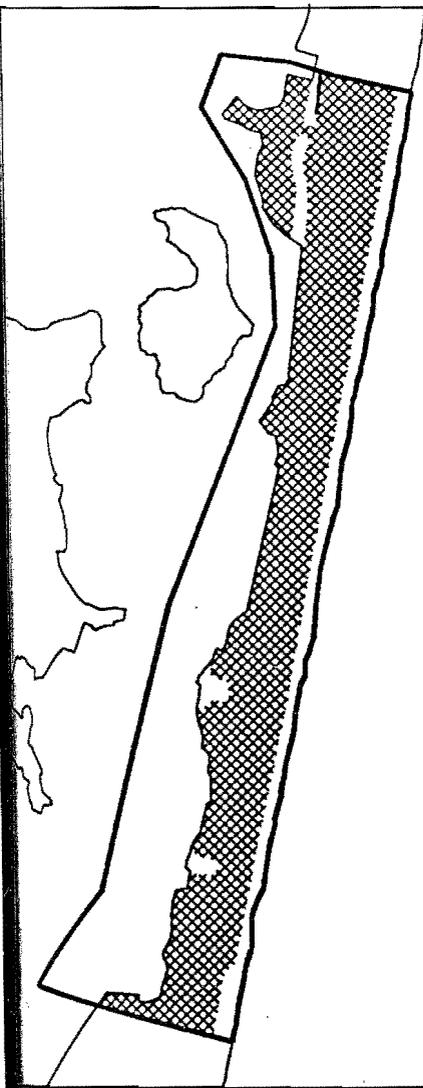


# STAGES OF DEVELOPMENT IN MANTOLOKING BORO

POPULATION - 360  
SIZE - 0.697 SQ. MI.



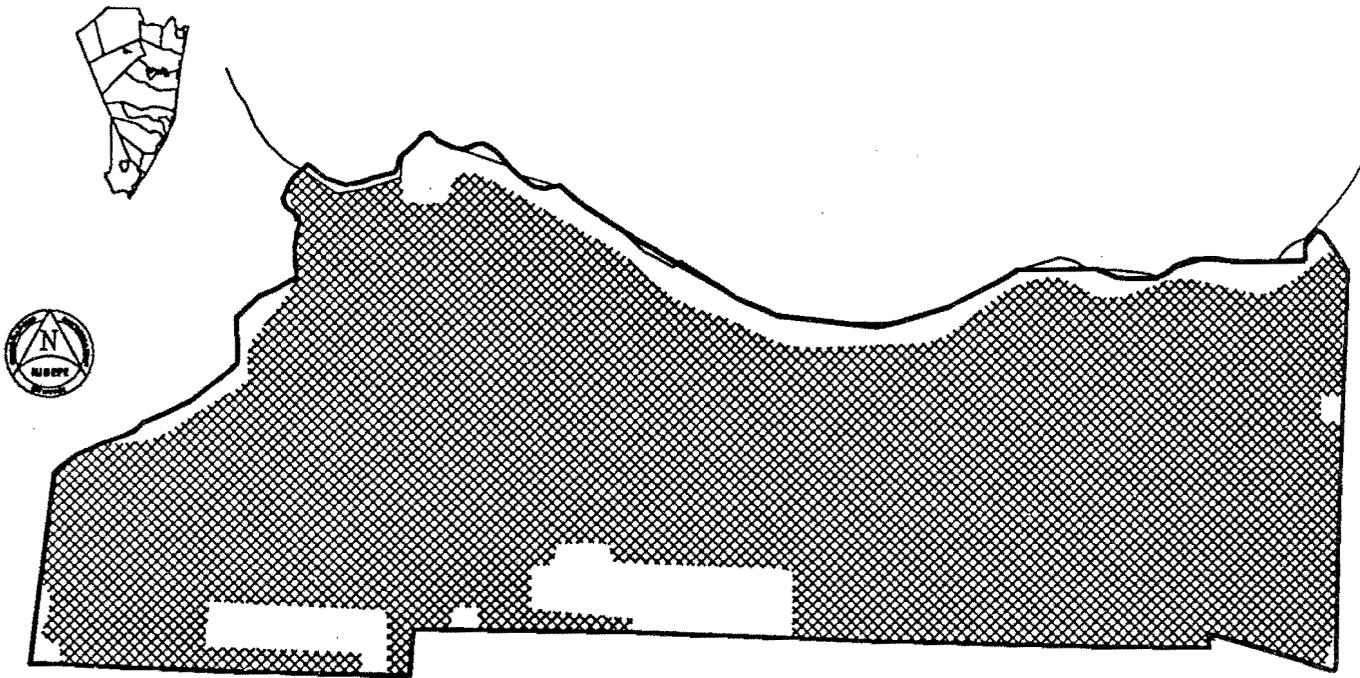
- ▣ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND



# STAGES OF DEVELOPMENT IN OCEAN GATE BORO

- ▣ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND

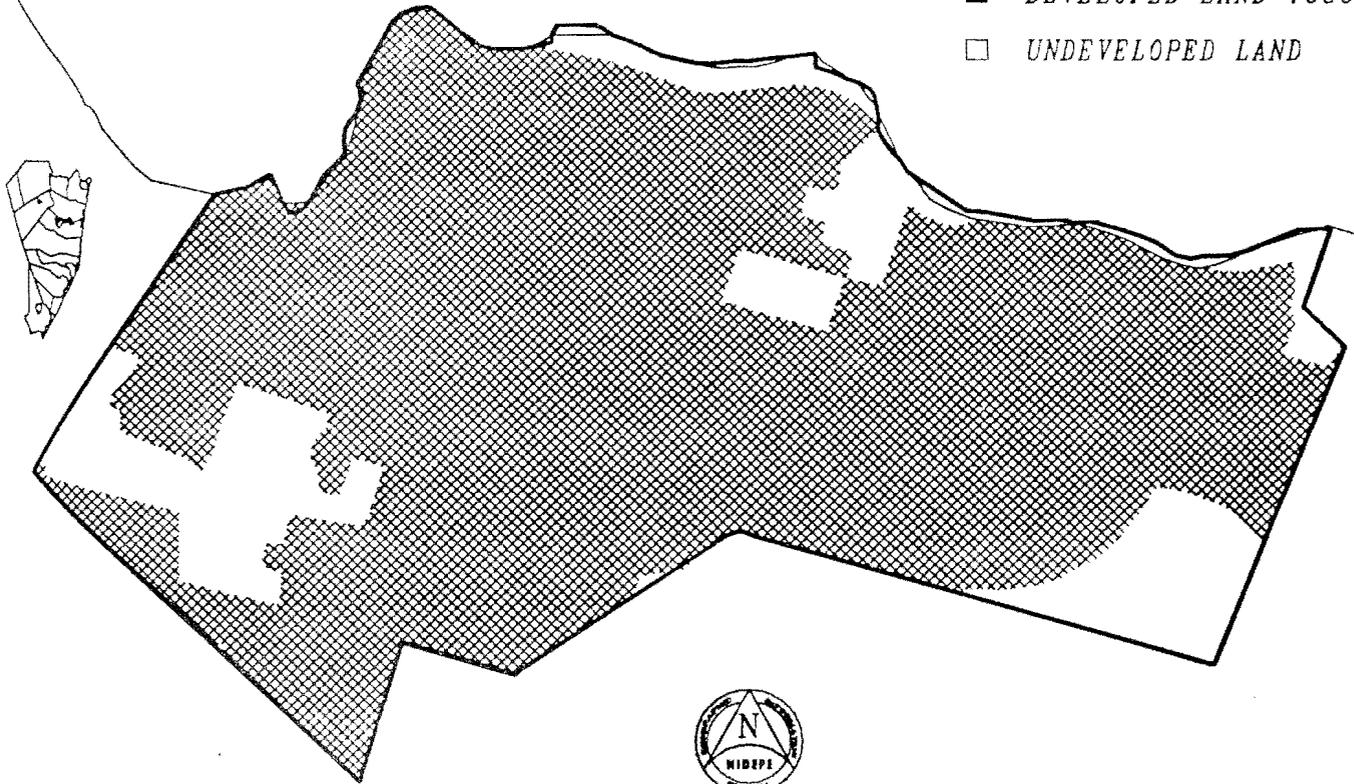
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SIZE - 0.437 SQ. MI.



# STAGES OF DEVELOPMENT IN PINE BEACH BORO

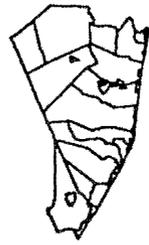
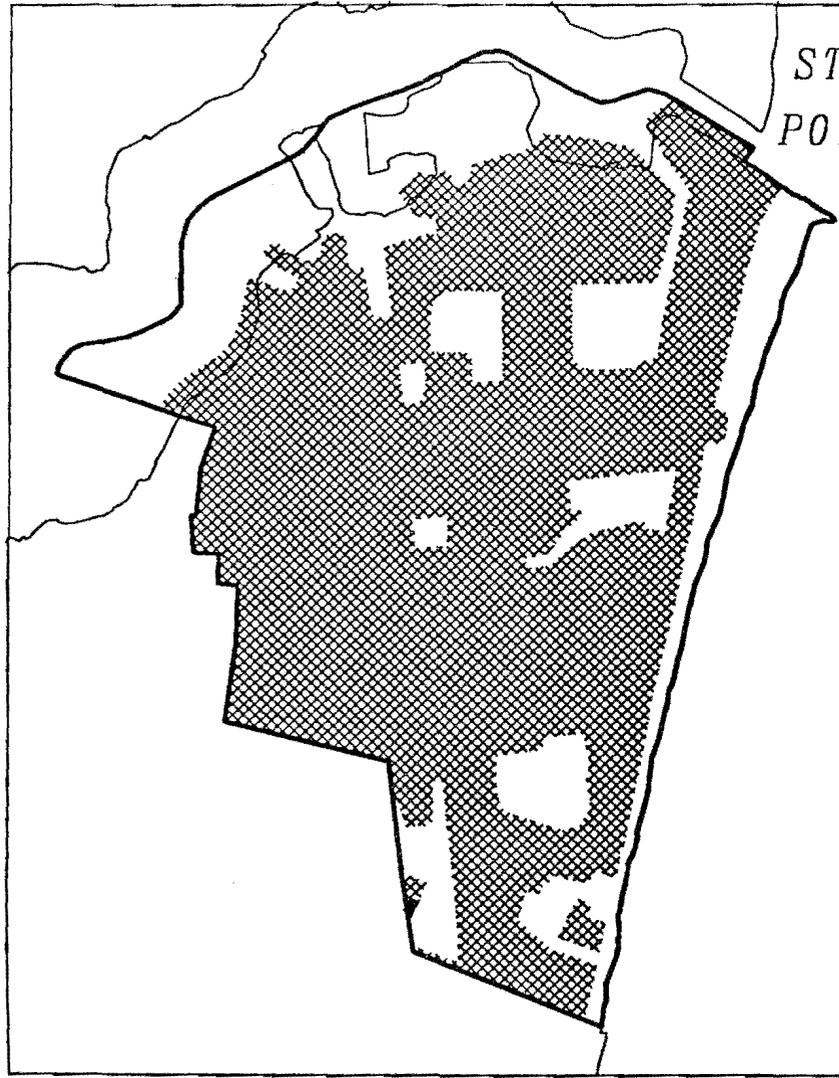
POPULATION - 1946  
SIZE - 0.637 SQ. MI.

- ▣ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND



# STAGES OF DEVELOPMENT IN POINT PLEASANT BEACH BORO

POPULATION - 5116  
SIZE - 1.764 SQ. MI.



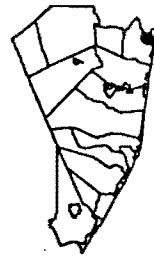
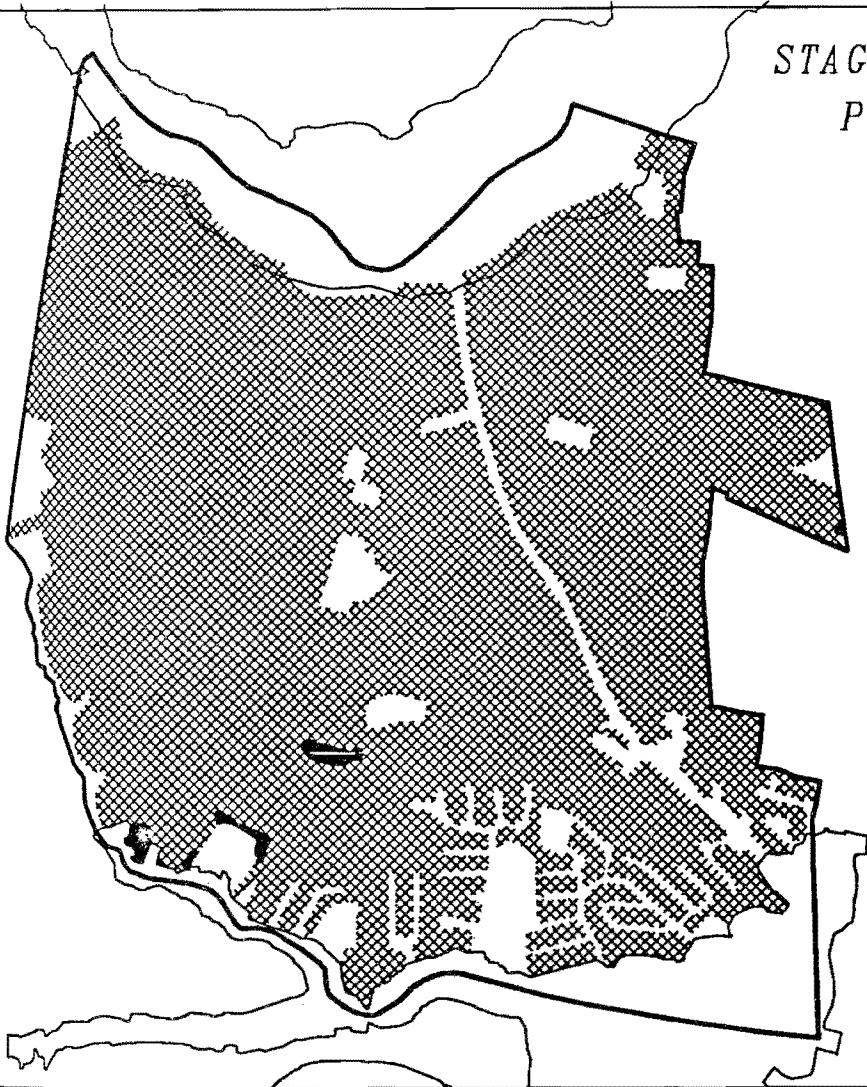
- ▣ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND



STAGES OF DEVELOPMENT IN  
PT. PLEASANT BORO

POPULATION - 18110

SIZE - 4.223 SQ. MI.

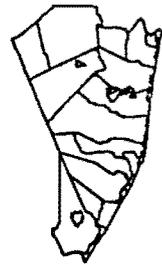


-  DEVELOPED LAND 1972
-  DEVELOPED LAND 1986
-  UNDEVELOPED LAND

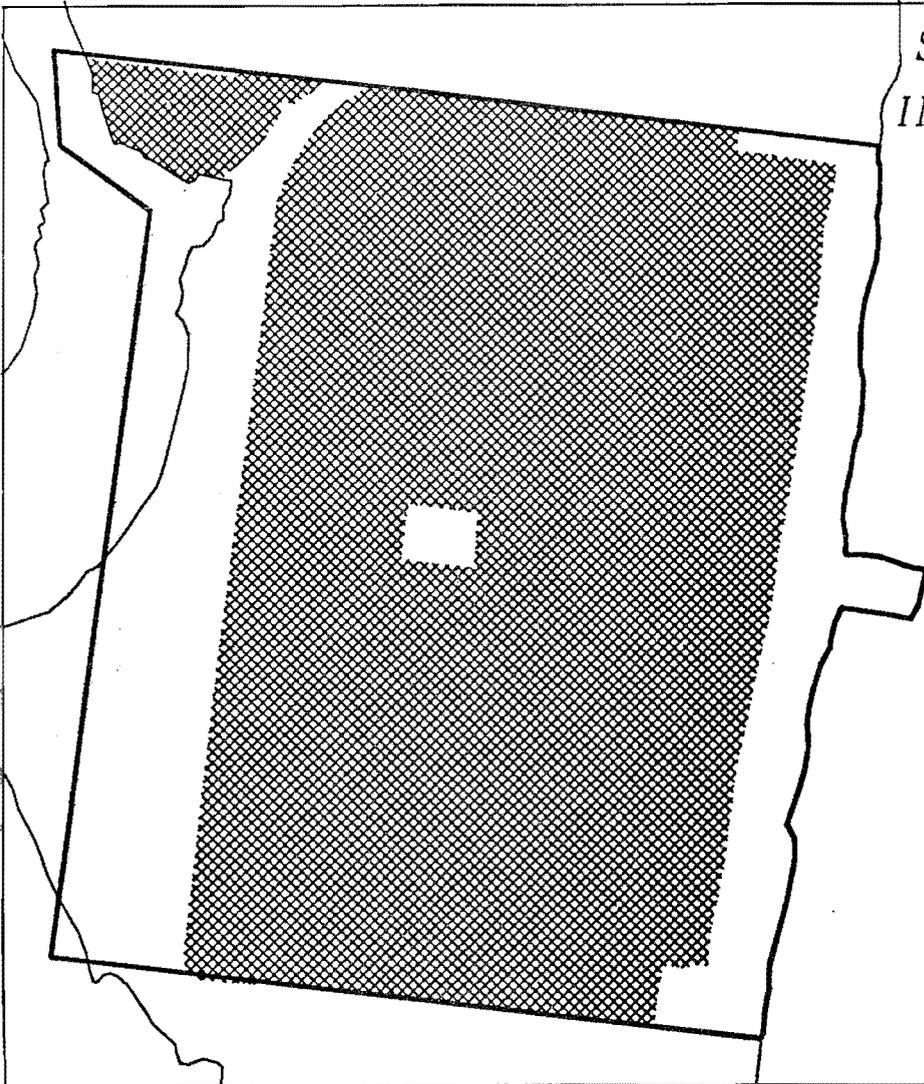


STAGES OF DEVELOPMENT  
IN SEASIDE HEIGHTS BORO

POPULATION - 2198  
SIZE - 0.511 SQ. MI.

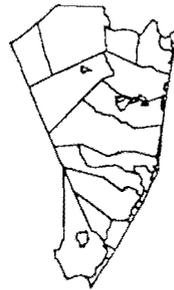


- ▣ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND

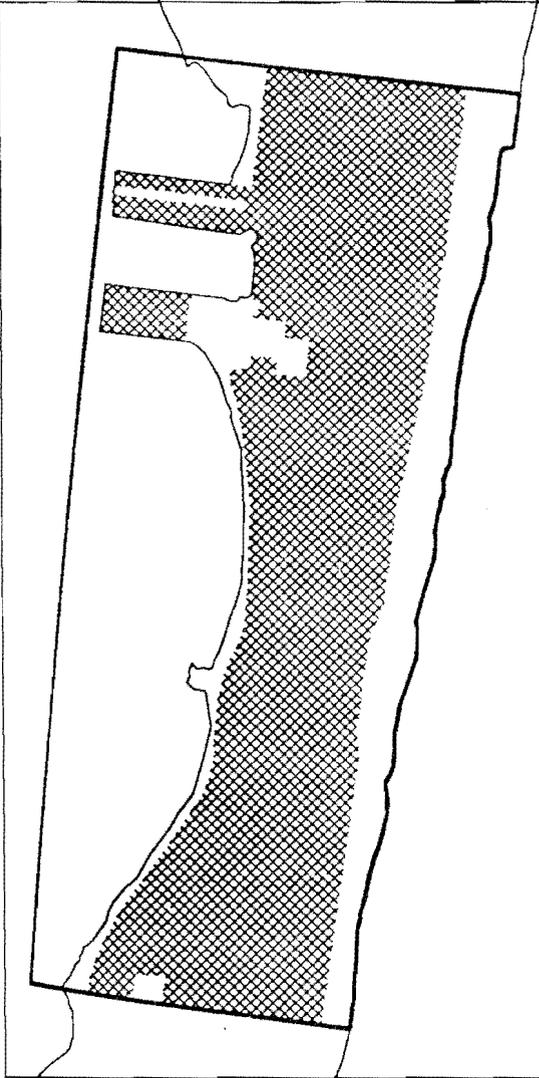


# STAGES OF DEVELOPMENT IN SEASIDE PARK BORO

POPULATION - 1767  
SIZE - 1.073 SQ. MI.

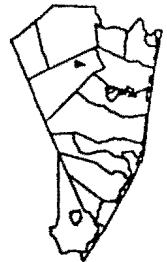


- ▣ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND

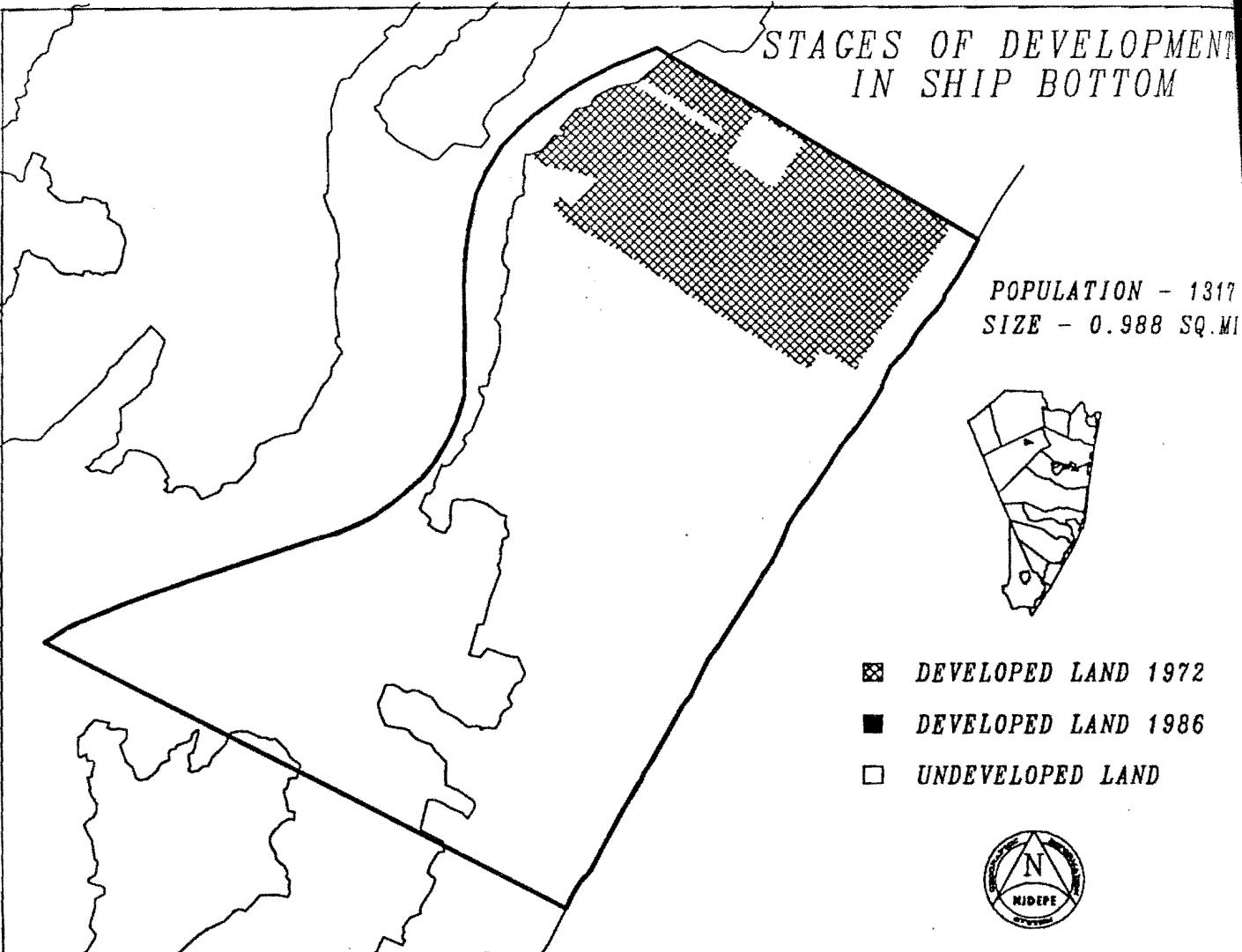


# STAGES OF DEVELOPMENT IN SHIP BOTTOM

POPULATION - 1317  
SIZE - 0.988 SQ. MI.

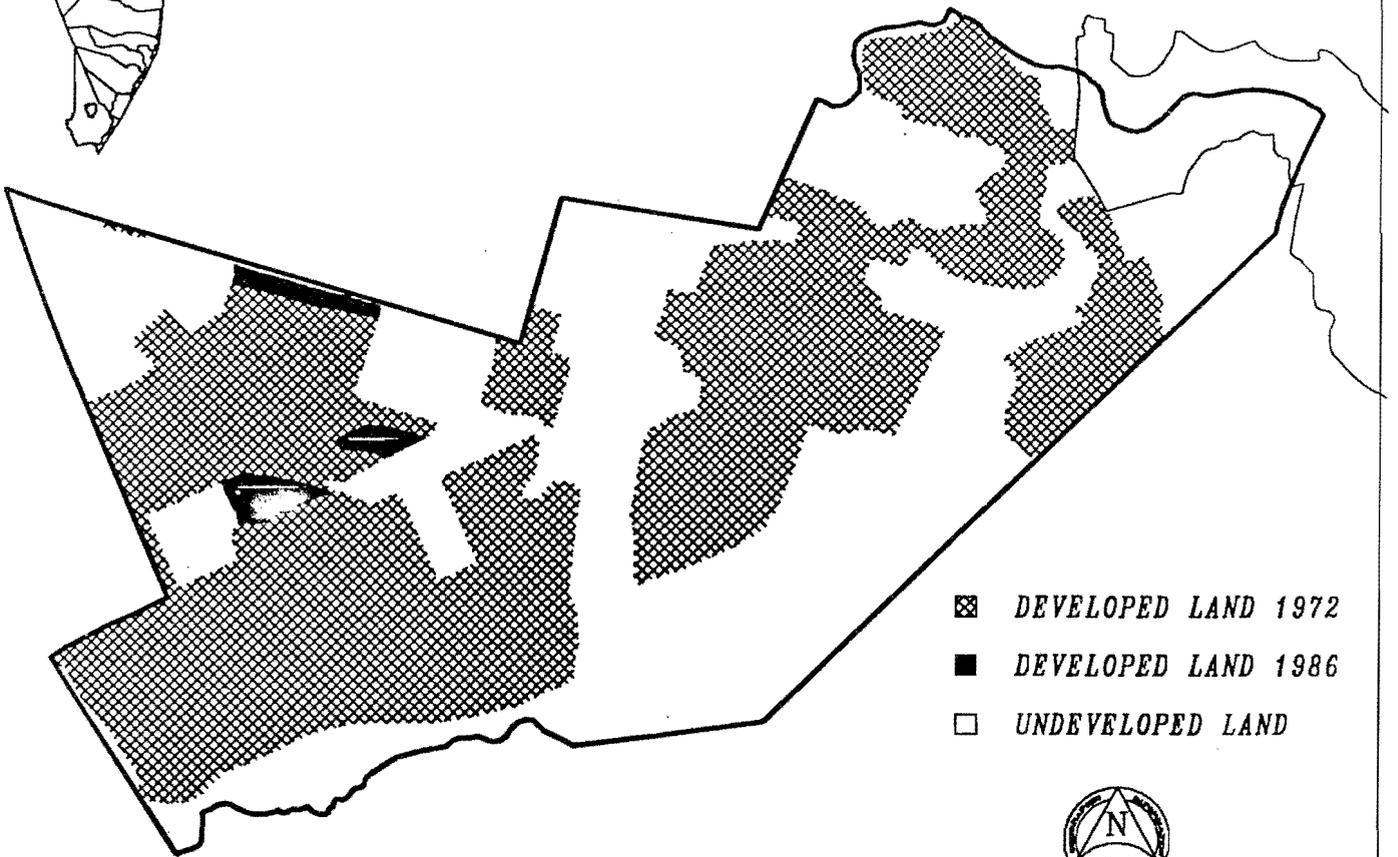
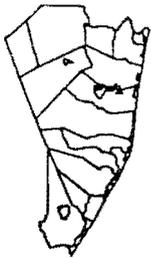


- ▣ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND



# STAGES OF DEVELOPMENT IN SOUTH TOMS RIVER BORO

POPULATION - 3866  
SIZE - 1.234 SQ. MI.

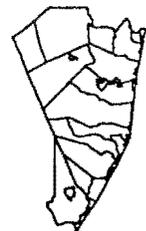


- ☒ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND



STAGES OF DEVELOPMENT  
IN SURF CITY BORO

POPULATION - 1341  
SIZE - 1.320 SQ.MI.



- ▣ DEVELOPED LAND 1972
- DEVELOPED LAND 1986
- UNDEVELOPED LAND



APPENDIX 5  
GROWTH MANAGEMENT OPTIONS

**A WATERSHED MANAGEMENT PLAN FOR BARNEGAT BAY  
DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ENERGY  
LIST OF GROWTH MANAGEMENT OPTIONS**

**GROWTH MANAGEMENT TECHNIQUES**

Zoning  
Development Allocation  
Siting/Timing of Utilities and Public Facilities  
Cluster Development  
Planned Unit Development  
Incentive Zoning  
Conservation Zoning  
Impact Fees  
Donation of Property  
Transfer of Development Right  
Transfer of Development Credits  
Regional Tax Base Sharing  
Public Fee Simple Acquisition  
Land Banking  
Development Criteria Point System/  
Performance Zoning

**Method #1**  
**Zoning**

Description

Zoning controls land uses and standards regarding lot area, development density, height and bulk of buildings.

Brief Assessment

Traditional zoning was originally created to protect public health and safety and separate land uses. The model zoning act was based on New York City's ordinance which was designed for a development pattern which generally occurred lot by lot. Traditional zoning was also strongly affected by the Supreme Court case Village of Euclid v. Ambler Realty Co., which supported the protection of neighborhoods of single-family detached houses. In general, zoning was not designed for growth management; the original goals did not include the prevention of sprawl or the protection of natural resources. For this reason, attempts to do this have had to expand on the original structure.

In New Jersey the power to zone is provided to the municipalities by the state through the Municipal Land Use Law (Chapter 291, Laws of N.J. 1975) . Part of this power is the ability to provide a variety of variances to the existing zoning requirements. As per the law, a development application can only go before the planning board or the zoning board of adjustment. Some variances can only be issued by the zoning board, therefore some development applications only

appear before the zoning board for both a variance and site plan or subdivision review. Typically, the role of zoning boards is to focus on case-by-case issues, rather than have a more comprehensive planning approach. Therefore, a gap can exist between the planning process and development regulation.

There is also a separate, but related, phenomenon which affects the ability of zoning to serve as a means of growth management. The property tax system encourages municipalities to seek certain types of revenue-producing development in order to fund public services. Hence, fiscal interests often drive zoning decisions and conventional zoning does not serve well to manage growth.

In summary, zoning is one means by which the municipalities around Barnegat Bay can regulate development, however, by itself it is not sufficient to manage growth.

## **Method #2** **Development Allocation**

### Description

The above term refers to having a predetermined amount of growth allocated to each geographic or political area (1)based on vacant developable land (some percent of vacant land can be developed OR (2)allocate additional pollutant loading by watershed or municipality based on actual or calculated pollutant loading (e.g., allow some percent increase over current total loadings, or some percent increase over pollutant loading from undeveloped land)

### Brief Assessment

#### 1. Advantages

Easy to calculate and administer. Can provide some flexibility to the extent that there is more demand than allocation available. In this case, the administering agency could select the "best" proposals based on environmental or other criteria, or could dispense the allocation on a first come, first served basis.

#### Disadvantages

Unless development proposals must compete for limited allocation based on their water quality "performance", there would be no incentive to control pollutant loadings from new development (although loadings could be reduced through use of development standards). Need to also require monitoring to determine whether water or resource quality is affected by additional development.

#### 2. Advantages

This option provides incentives for approval of "non-polluting" development forms and technologies (the "cleaner" the development, the more growth can occur). The growth allocation can be used as a total pollutant budget; successful nonpoint source remediation efforts associated with existing development could be "traded" for new development as long as there is no increase in pollutant loading.

### Disadvantages

May result in resource degradation unless impacts are monitored. This type of program will be difficult to support on technically quantifiable grounds; some level of generalization and "rules of thumb" will have to be accepted by the regulatory and regulated communities. (Because it would be hard to accurately quantify water quality degradation and its relationship to land use, municipalities might be able to use other, less directly related, means of measurement such as increased traffic congestion or loss of open space.) Implementation would be more complicated than an allocation program based on developable land. It may be difficult to incorporate consideration of aerial deposition, which is a significant component of pollutant loadings in some locations.

In addition, the fact that building "cleaner" development means that more growth can occur can also result in loss of open space and a lowered quality of life.

In summary, this type of program may not be applicable to the Barnegat Bay watershed in the near future for the following reasons: 1) there needs to be a well established on-going monitoring program 2) there needs to be a governmental authority with the means and incentive to implement it 3) it doesn't directly take into consideration factors such as traffic congestion, loss of open space or general degradation of the quality of life. However, such a program may be found to be more applicable in the long term.

### **Method #3**

#### **Siting/Timing of Utilities and Public Facilities**

##### Description

This growth management technique directs development to areas currently served by adequate public facilities or to which public facilities can concurrently be provided within an identified service area. This is known as a "concurrency" requirement. Development is then directed away from areas not scheduled for service. Planning can be done through use of the municipal Capital Improvements Program because the Municipal Land Use Law requires that all actions which require the expenditure of public funds must be referred to the municipal planning board for review and recommendation.

##### Brief Assessment

Use of this method requires that the area to be preserved has to not already have services or have limited capacity. Also, the assumption is made that land will be able to be developed eventually as the service area expands; it does not differentiate between land which can be developed and environmentally sensitive areas or other open space which should not. In order for this method to be successful, there needs to be consistency between regulatory programs at the state, county and local levels. In addition, a new development should not lower a public facility's level of service below the established standard. Therefore, in order to encourage concentration of development, lower levels of service need to be provided for areas of denser development. These areas

should then be given priority for capital expenditures for facility renovation and expansion.

In summary, this method could be applicable as part of a larger growth management program.

#### **Method #4** **Cluster Development**

##### Description

Cluster development provides the option of grouping units closer together than permitted by local zoning. The purpose behind this type of development is usually so that the rest of the parcel can be preserved as open space.

##### Brief Assessment

Clustering of units reduces the infrastructure requirements, as well as the need for other services. It also provides environmental and aesthetic benefits by reducing land area used for development. The Municipal Land Use Law requires that if municipalities want to use clustering, they must adopt an ordinance specifying the standards, though clustering can be optional or mandatory. The principal requirement for success is that a community know well in advance, on an areawide basis, what land it wants to protect (HAMILL et al., 1989). The degree to which clustering accomplishes a significant saving of land, while providing an attractive and comfortable living environment, depends largely on the quality of the zoning regulations and the expertise of the development designer (DeGROVE, 1991). If overall density is figured for the whole parcel, rather than the net buildable area, the result may be more dwelling units than would have been allowed under conventional subdivision regulations.

#### **Method #5** **Planned Unit Development**

##### Description

A planned unit development (PUD) is a large scale version of clustering (see above). The PUD concept permits mixture of uses (a PUD would typically include residential, commercial, industrial, community and open space land uses), promotes creativity of design, and encourages preservation of open space (MONMOUTH, 1987). Use of PUDs allows density transfers and other negotiations with developers within the requirements of the zoning classification of the property.

##### Brief Assessment

A PUD can be required by municipality if necessary to protect natural areas. areas to be protected should be on master plan maps (HAMILL et al., 1989). The commercial and industrial features of a PUD can serve a dual purpose. Besides providing goods and services and employment opportunities, these

non-residential uses provide a source of tax ratables and help in offsetting the costs of public services. In this manner it is possible for a PUD to "pay its own way" and enables a community to avoid the impacts normally associated with large-scale growth. Those land uses which generate moderate revenues (i.e., residential) can be scheduled to coincide with the development of land uses which generate greater revenues, such as commercial and/or industrial facilities (MONMOUTH, 1987).

## **Method #6** **Incentive Zoning**

### Description

Incentive zoning allows development at higher densities in return for the developer providing amenities offering a benefit to the community. As an example of growth management using incentive zoning, a developing community may allow a developer to build at a higher density than permitted by the zoning ordinance provided the development is staged over a period of time. The staging of development would allow the community time to provide the necessary public services (MONMOUTH, 1987).

### Brief Assessment

Bonus or incentive zoning provides flexibility in land use decisions. The municipality typically retains discretion to permit or deny a specific proposed "bonusable" amenity. Furthermore, implementation does not demand a sophisticated or expensive administrative program. Bonus or incentive zoning will generally be upheld so long as it promotes a reasonable governmental objective. A bonus or incentive zoning system is appropriate when a community decides to encourage rather than require the provision of certain benefits. Communities frequently use a hybrid system. Some public amenities or facilities are required. Others may, at the developer's option, be provided in exchange for a density bonus. The decision whether to mandate or encourage public amenities through density bonuses is generally a political one; however, municipalities may decide to use a bonus system rather than an exaction program to avoid legal challenges. The municipality must ensure that the underlying zoning, absent any bonuses granted, leaves the owner with some economic use of that land (MARINE LAW INSTITUTE, 1988).

## **Method #7** **Conservation Zoning**

### Description

Conservation zoning is a means by which municipalities can protect environmentally sensitive areas which may not already be protected by State law. (This goal differs from that of most zoning, which is usually to put order to development.) Conservation zoning requires that the municipality first identify sensitive areas through a natural resources inventory, then show these areas on the municipal zoning map, then limit development through means such as

minimum lot size requirements. The Township of Marlboro in Monmouth County makes use of conservation zoning. A copy of the applicable ordinance is attached.

### Brief Assessment

The zoning ordinance must be strong enough to effectively protect the sensitive area, yet permit a land use which renders the ordinance politically and legally acceptable. With this in mind, the municipality should be prepared to demonstrate that the area includes a sensitive resource which it is in the public interest to protect and that the zoning will, in fact, protect it. Another major objective in designing land use controls such as conservation zoning is permitting enough development to guard against court challenges and to satisfy voters that the regulations are not too restrictive (COUGHLIN, 1991).

### Method #8 **Impact Fees**

#### Description

Impact fees are payments made by the developer to a community to cover the costs of new public services which the development will require.

#### Brief Assessment

Impact fees help pay for the effects of development on a community's infrastructure, but they are not a means of directing growth.

### Method #9 **Donation of Property**

#### Description

A land owner can insure that their property will remain free from development in perpetuity by making a tax-deductible contribution of their land, or the development rights to the land, to a public body or to a private, non-profit group (MONMOUTH, 1987). The land use restriction could also occur through provision of a conservation easement.

#### Brief Assessment

Donation of property is a good means of preserving open space. However, because it is usually a fairly random process, it has minimal benefit for growth management.

## **Method #10**

### **Transfer of Development Right Transfer of Development Credits**

#### **Description**

##### **Transfer of Development Rights**

The right to develop a piece of land as allowed by zoning and land use controls is one of the rights that comes with property ownership under the "bundle of rights" theory (DeGROVE, 1991). Transfer of Development Rights (TDR) is a means by which a community may allow a landowner to get development value from their land, yet provide for the control of the direction of growth through the designation of land as a "sending" (protection or preservation) or "receiving" (growth) area. The development rights of the landowners in the "sending" area may be bought by landowners in the "receiving" zone so that the land in the sending area is then restricted from development. After purchase of these development rights landowners in receiving zones may develop at higher densities than would have been allowed under conventional zoning.

##### **Transfer of Development Credits**

Transfer of Development Credits (TDC) is similar to TDR, but property owners in both transfer and conservation zones are given options: to build at reasonable densities "by right" or to pursue the transfer of development credits (HAMILL et al., 1989).

#### **Brief Assessment**

Development of a TDR program would require an act of the legislature; a TDC program would probably be upheld in court (HAMILL et al., 1989). TDR programs tend to be quite complex and require the attention of dedicated administrative personnel. TDR programs have met with mixed success. The most commonly mentioned problems are the lack of markets for TDRs (possibly due to inadequate promotion of the program), and resentment by residents in the receiving zone (who must contend with the dense development TDRs allow). Large municipal programs have a mixed track record, though small municipal programs seem to be doing well. Although municipalities have less money with which to hire professional planners than counties do, they may be able to design and administer a program with more sensitivity. Designing the receiving zone appears to be the area that requires the most care (DeGROVE, 1991).

## **Method #11**

### **Regional Tax Base Sharing**

#### **Description**

Within a system of regional tax base sharing tax benefits generated by new development are pooled and redistributed within a county or metropolitan area (MONMOUTH, 1987).

### Brief Assessment

Regional tax base sharing removes the disincentive for protection of environmentally sensitive areas by public ownership and location of tax exempt properties while preserving local autonomy and decision making and leaving the existing tax base of each municipality untouched (MONMOUTH, 1987). This system has been successfully used in the Hackensack Meadowlands in northern New Jersey.

### **Method #12**

#### **Public Fee Simple Acquisition**

##### Description

In this case, public fee simple acquisition involves the purchase of land by the government in order to preserve open space for public purposes.

##### Brief Assessment

The success of this method is dependent on securing a source of funding, such as a property tax, real estate transfer tax or municipal bond. Realistically, due to the finite resources that could be available, land acquisition programs should be expected only to complement and not replace appropriate techniques used for growth management (DeGROVE, 1991).

### **Method #13**

#### **Land Banking**

##### Description

Land banking means that government purchases land for later use in accordance with a long-range master plan. When the land is ready to be used it may be leased or sold to private owners. In the meantime, however, the government has control of the land by virtue of its title and may rent it out for temporary uses (WENGERT, 1979).

##### Brief Assessment

This device allows a community to control timing and location of development. Although the government may receive some return on the land before selling it, funds must still be raised for the initial capital outlay.

### **Method #14**

#### **Development Criteria Point System/ Performance Zoning**

##### Description

A set of locational and/or performance criteria is developed and points assigned to each. Development applications are then judged relative to these criteria and a total point score calculated. Proposals must receive a minimum number of points to be considered acceptable and benefit from achieving higher scores.

An example of some potential point categories is: location (e.g. proximity to infrastructure with adequate capacity); water quality protection; water-dependent facilities; buffer enhancement; and habitat protection. An example of a variety of a point system can be found in the Cecil County Chesapeake Bay Critical Area Program for Cecil County, Maryland. (see attached) The Cecil County system is set up as a contest. The land within 1000' of tidal waters is divided into three categories ranging from more to less restrictive. Developers have the option of attempting to get less restrictive requirements applied to their parcel. In order to do this, their development proposal will be judged based on the project design and points assigned for resource protection. The applications are then ranked.

Another example of performance zoning is the Land Development Guidance System (LDGS) in use in Fort Collins, Colorado. The LDGS includes two classes of review criteria. There are 46 absolute criteria which developments must satisfy to gain approval. They cover neighborhood compatibility, compliance with adopted plans, minimum engineering and public service requirements, and compliance with resource protection, environmental, and site design standards. Each proposal, according to its category of land use, must also achieve a specified minimum level of points with regard to variable criteria. Projects can receive points for concentrating development, building mixed-use or infill development, achieving transportation objectives, and increasing density in residential development. Developers are thus rewarded for addressing the city's planning objectives (HAMILL et al., 1989).

#### Brief Assessment

Use of a point system has potential for growth management and environmental protection, however, as has been found in Cecil County, Maryland, the process can be quite cumbersome and often an applicant has to lay out a lot of money before knowing whether a project will be approved. However, Fort Collins, Colorado has found that the need for rezonings and variances has declined and that decisions are contested less frequently (HAMILL et al., 1989).

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# CECIL COUNTY GROWTH ALLOCATION POINT SYSTEM

## Establishing the Annual Point Schedule

The Planning Commission shall annually publish a notice of the opening of the annual Growth Allocation point competition and the proposed point system. The public shall have thirty (30) days in which to comment in writing on the proposed point awards after which a final point system shall be adopted by resolution of the County Commissioners. Points will be assigned by the County in, but not limited to, the following categories:

1. Development type
2. Buffer enhancement
3. Location
4. Forest and Woodland protection
5. Habitat protection
6. Water Quality protection
7. Resource utilization
8. Water Dependent Facilities
9. Erosion control

Applications for Growth Allocation must be consistent with the current zoning of the property. No project for Growth Allocation will be accepted which is not consistent with the density permitted in the current base zoning classification. Scoring of each proposed development project by the Planning staff and Planning Commission will be based on the point award system set forth below.

## Proposed First Annual Cycle Scoring Schedule

### Scoring Thresholds

A two tiered scoring threshold will be established to screen projects. Only those projects scoring a total score at or above the first tier (56 points) threshold shall be considered for Growth Allocation. At a minimum, all projects scoring at or above the second tier (94 points) threshold will be awarded Growth Allocation and granted the Growth Allocation floating zone. Bonus points shall not qualify for inclusion in the first tier threshold.

### General Provisions

The following general provisions shall apply in the award of Growth Allocation:

1. For residential subdivisions, the maximum lot size permitted in a RCA conversion is the minimum lot size permitted on the site by Health Department Regulations.

2. In a RCA to LDA conversion, higher points will be awarded for having a 60 percent open space ratio. This will allow the majority of the site to continue to provide the benefits of RCA, since it will be dominated by agriculture, wetlands, forest, barren land, surface water, or open space and protective land uses. The impact of the Growth Allocation conversion will be less than if a smaller open space ratio is achieved. Tidal wetlands, reforested areas, and Buffer extensions may be counted in the 60 percent open space ratio provided that at least three-quarters of the open space is upland.
3. In a LDA or RCA to IDA conversion, higher points will be awarded for providing a 30 percent open space ratio if evidence is included that the site continues to exhibit the characteristics of a LDA, i.e., containing areas of natural plant and animal habitats, and that the quality of runoff is not substantially altered or impaired. If these conditions can be demonstrated, it is assumed that the impact of the Growth Allocation conversion is less than if a smaller open space ratio is achieved. Tidal wetlands, reforested areas, and Buffer extensions may be counted in the 30 percent open space ratio, provided that at least three-quarters of the open space is upland areas.
4. All proposed projects located adjacent to a municipality will be scored in the same manner as all other projects, except that such projects may be designed to the development codes of the adjacent municipality (including the municipality's Critical Area Program) if it is to be annexed. In addition, projects endorsed by a municipality will be awarded special bonus points, provided the entire proposed development site is to be annexed into the municipality. Such projects shall be incorporated into the municipality within one (1) year of approval.
5. In an RCA to LDA conversion, which involves land only in the Critical Area, calculation of the maximum permitted density will be based on Critical Area acreage. The maximum permitted density within the Critical Area portion of the site may not exceed the base zone density for the Critical Area portion of the site or 3.99 units per acre, whichever is less.
6. In an RCA to LDA conversion, where non-Critical Area portions of a site are included in the development, the maximum permitted density may not exceed the base zoning density calculated for the entire site, or 3.99 units per acre as calculated based on the size of the Critical Area portion of the site, whichever is less.
7. In a RCA or LDA conversion to IDA the permitted maximum density or intensity shall not exceed that permitted by the base zoning.
8. Large Lot Residential is defined as lot size in excess of the minimum required by the Health Department.
9. A development pad (permitted area of disturbance) is defined as the area of a lot devoted to structures, drives and parking areas.

10. In projects that include water-dependent facilities, locating such facilities in the Buffer will not be reason for denying Buffer points, if a Buffer is provided on portions of the site that are not required for locating such facilities. In such cases Buffer points for water-dependent facilities will be awarded as set forth below, provided non-water dependent facilities are not located in the Buffer.
11. These criteria shall apply to lots of record as of July 5, 1988.
12. Parcels having already utilized the Special Growth Allocation are not eligible for this contest.

### Point Criteria and Values

1. Development Type (maximum possible points = 25)

#### Clustering

- Where dwelling units are concentrated in a selected area of the development tract so as to provide natural habitat or other open space uses on the remainder. Points = 3

#### Conversion of RCA to LDA

- Where a 60 percent open space ratio is maintained throughout the entire Critical Area portion of the site only. Points = 12

OR

- Where a 60 percent open space ratio is maintained throughout the entire site, and where open space outside the Critical Area portion of the site is a minimum of 20 acres. Points = 22

#### Conversion of LDA and RCA to IDA

Community sewer facilities are an *a priori* requirement for conversion to IDA. If a community sewer facility is not present or not proposed as part of the development, conversion to IDA will not be permitted.

- Where a 30 percent open space ratio is maintained throughout the entire Critical Area portion of the site only. Points = 12

OR

- Where a 30 percent open space ratio is maintained throughout the entire site, and where open space outside the Critical Area portion of the site is a minimum of 20 acres. Points = 22

2. Buffer Enhancement (maximum possible points = 20)

<u>Minimum Depth of Buffer</u>	<u>Points</u>
Required	0
Required plus 50 feet	4
Required plus 100 feet	6
Required plus 150 feet	7
Required plus 200 feet	9

Required = 110 feet plus any expansion required by location of the Buffer adjacent to sensitive areas.

	<u>Portion of Buffer afforested by Applicant</u>				<u>Depth of Buffer</u>
	<u>25%</u>	<u>50%</u>	<u>75%</u>	<u>100%</u>	
Points	1	2	3	4	Required (as above)
Points	1	2	3	4	Required + 50'
Points	1	2	3	4	Required + 100'
Points	2	3	4	5	Required + 150'
Points	2	3	4	5	Required + 200'

Drainageways are: Minor watercourses which are defined either by soil type or by the presence of intermittent or perennial streams or topography which indicates a swale where surface sheet flows join, including the land, except where areas are designated as floodplain, on either side of and within fifty (50) feet of the centerline of any intermittent or perennial stream shown on the U. S. Geological Service's 7 1/2 minute Quadrangle sheets covering Cecil County.

- Where a 50-foot forested buffer, which remains in open space, is established along all drainageways on the site. Points = 4

OR

- Where a 50-foot forested buffer, which remains in open space, is established along all drainageways on the site, including those portions of the site located outside the Critical Area. Points = 6

3. Location of Development (maximum possible points = 15)

- Conversion of LDA or RCA to new IDA which is located in existing LDA or adjacent to existing IDA. Points = 10

OR

- Conversion of RCA to new LDA which is located adjacent to existing LDA or IDA. Points = 10

AND, all proposed projects that are located adjacent to a municipality will be evaluated and scored in the same manner as all other projects, except that such projects may be designed based on development codes of the adjacent municipality, including that municipality's Critical Area Program, if intended to be annexed. In addition, if the projects are endorsed by the municipality, said endorsement consisting of a letter from the municipal officials, they will be awarded points provided that the entire proposed development site is to be annexed into the adjacent municipality. A condition of approval for such projects will be that the site must be incorporated into the adjacent municipality within one year of approval. Points = 5

4. Forest and Woodland Protection (maximum possible points = 10)

- If 40 percent or more of the Critical Area portion of the site is wooded, and less than 15 percent of the existing forest and woodlands are cleared. Points = 1
- If 40 percent or more of the Critical Area portion of the site is wooded, and less than 10 percent of the existing forest and woodlands are cleared. Points = 4.
- Where forest cover exclusive of Buffer Area and existing forest is increased as follows:

<u>Afforestation</u>	<u>Area of Forest Cover increased by:</u>		
	<u>30%</u>	<u>50%</u>	<u>70%</u>
Critical Area portion of site	3	4	5
Entire site where non-Critical Area portion is 5 acres or more.	4	5	6

5. Habitat Protection (maximum possible points = 10)

- Where a disturbance, of palustrine, non-tidal wetlands or hydrologic regime of non-tidal wetland, mitigation notwithstanding, is avoided. Points = 1
- Where permanent environmental easements on existing plant, wildlife and related habitat enhancement areas are donated. Points = 4
- Where the following existing Habitat Protection Areas are not present on, or adjacent to, the site: rare, threatened and endangered species, Natural Heritage Areas, and colonial waterbird nesting areas. Points = 4

- If the developed portion of the site is located the maximum distance possible from a habitat protection area minimum setback. Points = 2
- If measures are implemented which enhance the Habitat Protection Areas in the area of the site as recommended by the Cecil County Planning Commission and the Maryland Forest, Park and Wildlife Service. Points = 2
- If there is implementation of a forest management program which is designed to protect the habitat values of existing and newly created riparian forests and large forested areas (if the site includes 5 acres or more outside of the Critical Area), and this program is prepared in conjunction with the Cecil County Planning Department and the Maryland Forest, Park and Wildlife Service. Points = 1

6. Water Quality (maximum possible points = 8)

RCA to LDA conversion

For impervious surfaces less than 15 percent, points assigned as follows:

<u>Impervious surface</u>	<u>Points</u>
15% or less	0
14% or less	1
12% or less	2
10% or less	5
8% or less	8

LDA and RCA conversion to IDA

For impervious surfaces less than 70 percent, points assigned as follows:

<u>Impervious surface</u>	<u>Points</u>
70% or less	0
60% or less	1
50% or less	2
40% or less	5
30% or less	8

7. Resource Utilization (maximum possible points = 6)

- Where agriculture or silviculture is continued on the open space portions of the site in the Critical Area. Points = 3

OR

- Where agriculture or silviculture is continued on the open space portions of the entire site, where the site includes at least 20 acres in agriculture outside the Critical Area. Points = 6

8. Erosion Control (maximum possible points = 3)

- Where shore erosion protection measures are installed on 50 percent of the remaining shoreline where needed, and use of non-structural shore erosion controls where feasible. Points = 2
- Where shore erosion protection measures are installed on 100 percent of the remaining shoreline, and use of non-structural shore erosion controls where feasible. Points = 3

9. Water-Dependent Facilities (maximum possible points = 3)

- Where community piers are provided. Points = 3
- Where shared piers by less than 3 property owners are provided. Points = 1.

10. Bonus Points

These points shall not be used for the first tier scoring threshold of 56 points, but may be accumulated for the second tier threshold.

- Where a proposed development includes community sewer facilities and the developer is able to expand the system to serve existing developed areas of failing septic systems, thereby correcting a documented existing water quality problem. The award of these points will be based on the feasibility of servicing adjacent areas as determined in consultation with the Health Department and the Department of Public Works. Actual points awarded will vary depending on the number of units served, the severity of the problem and other factors relating to feasibility. A general guideline will be that the correction of all failing septic systems in adjacent areas will earn maximum points. Maximum Bonus Point Value = 25
- Where a proposed development project provides free public access to the shoreline. Bonus Points = 25
- Where a natural park is designated and approved by the Cecil County Planning Commission, and, provisions are made to permit limited access to the natural park for educational purposes (e.g., periodically permitting the local school system to conduct field trips to the park), points will be credited. To receive these points a natural park management plan and program must be developed and include the recommendations of the Maryland Forest, Park and Wildlife Service. Bonus Points = 10

- Placing all remaining viable agricultural lands in the open space portion of the site in a Maryland Agricultural Preservation Program District. Minimum acreage applicable is 100 acres, or if farm is exceptionally productive, a waiver will be granted on this size minimum. Bonus Points = 5.

- (c) Subject to approval by the approving authority in each specific case, surface stormwater drainage may be carried in open ditches outside the right-of-way of the local streets or other suitable drainage structures within the right-of-way as may be approved by the Township Engineer.
  - (d) Curbs and/or gutters will not be required except where excessive grades or other conditions require their installation.
  - (e) Sidewalks will not be required.
- (3) Any further subdivision of any lot or lots subdivided under these standards, which further subdivision provides for an area of less than two hundred twenty thousand (220,000) square feet per lot, shall be conditioned upon the widening of the street to full width in accordance with current street standards, the provision for piped surface water drainage facilities and the total compliance with all other zoning and subdivision provisions, all at the expense of the subdivider and applying to all local streets constructed under these reduced requirements in the circulation pattern of the lot(s) in question and the complete drainage system serving the lots in question. The subdivider shall include these provisions as deed restrictions in deeds associated with the lands in question.

**§ 84-38. LC Land Conservation District.**

The following regulations shall apply in the LC Land Conservation District:

(Cont'd on page 8557)

**A. Permitted uses.**

- (1) Single-family dwellings.
- (2) Federal, state, county and municipal buildings and grounds.
- (3) Public and private golf courses but no other outdoor recreation facility. [Amended 5-19-88 by Ord. No. 23-88]
- (4) Temporary buildings for uses incidental to construction work, provided that such buildings are removed upon completion or abandonment of the construction work.
- (5) (Reserved)<sup>1</sup>
- (6) Commercial swimming pools and swimming clubs.
- (7) Cluster development. The reduction of lot size shall be permitted according to the following standards and the cluster provisions of § 84-35:
  - (a) The minimum size of a tract or parcel of land proposed for development under the cluster development provisions of this section shall be ten (10) acres.
  - (b) The maximum number of residential building lots for each cluster development shall be computed on the basis of sixteen-hundredths (0.16) lot per gross acre. If this calculation results in a remaining fraction of a lot, the fraction shall be rounded to the nearest whole number.
  - (c) Land area equal to a minimum of forty percent (40%) of the gross area of the proposed development shall not be included in lots but shall be either offered to the Township of Marlboro for conservation, open space and/or floodplain areas for public purposes or set aside as common property and maintained by a homeowners' association. Land utilized for street rights-of-way may be included as part of the above forty percent

<sup>1</sup> Editor's Note: Former Subsection A(5), Quasi-public recreation areas, was repealed 5-19-88 by Ord. No. 23-88.

(40%). All streets within the development shall be offered to the township.

(d) The minimum lot requirements for a cluster development shall be:

- [1] Lot size: fifty-five thousand (55,000) square feet.
- [2] Street frontage: two hundred (200) feet, except that a minimum frontage of one hundred fifty (150) feet may be allowed on lots where seventy-five percent (75%) or more of the frontage is on an outside curve having a radius of less than five hundred (500) feet, provided the resulting subdivision conforms to good subdivision design practices.
- [3] Lot width: two hundred (200) feet.
- [4] Front yard: seventy-five (75) feet.
- [5] Main building side yard: forty (40) feet; accessory building or structure, forty (40) feet.
- [6] Main building rear yard: fifty (50) feet; accessory building or structures: forty (40) feet. However, in those cases where the full length of the rear and/or side lot line is contiguous to a township-owned greenway of at least fifty (50) feet in depth and no portion of said rear or side line is within a perpendicular distance of one hundred fifty (150) feet of a township street right-of-way, an accessory building or structure may be located within fifteen (15) feet of the rear and/or side lot line meeting the aforementioned requirements. If a rear or side line setback of less than forty (40) feet is utilized, suitable landscaping shall be provided to shield the structure from the rear and side lot line direction, drainage shall be controlled so as not to cause flooding or erosion of adjacent property and site plan approval shall be requested. Under these conditions, the

minimum required rear and side line setback requirements of § 84-130B shall be fifteen (15) feet.

- (e) The lands offered to the township shall meet the following requirements:
- [1] The minimum size of each parcel so dedicated shall be four (4) acres.
  - [2] Every parcel of land so dedicated on a subdivision plat of a cluster development shall be conveyed to the township free of any liens of any nature at the time final approval is granted by the township to the final subdivision plat, and each parcel so dedicated shall have the following wording written on the plat in conformance with the subdivision provisions: "Lands dedicated to the Township of Marlboro for conservation, open space and floodplains under the cluster development provisions of the Land Use Development and Regulations Ordinance of the Township of Marlboro."
  - [3] The land so dedicated shall be contiguous to a minimum of twenty-five percent (25%) of the lots in the subdivision proposed for the cluster development.
  - [4] The lands so dedicated shall include, whenever feasible, natural features such as streams, brooks, wooded areas, steep slopes and other natural features of scenic and conservation value. The developer may be required to plant trees or make other similar landscaping improvements in order to qualify open land for acceptance by the township. Landscaping plans shall be prepared by a professional landscaper or one who commonly prepares landscaping plans. Each such person shall affix his name, title, address and signature to such plans.

- [5] The lands so dedicated shall be subject to approval by the Township Planning Board. The Board, in its review and evaluation of the suitability of such land, shall be guided by the Master Plan of the Township of Marlboro, by the ability to assemble and link such lands to adjoining areas in order to form continuous bands of open space and by the accessibility to potential utility of such lands.
  - [6] The proposed roads within the cluster development shall not interconnect with existing or proposed roads in a manner forming continuous or through roads.
  - [7] The proposed roads within the cluster development shall be designed to discourage any high-speed or through traffic, shall have the exclusive function of providing access to properties abutting the road and shall follow the contours of the land to the greatest extent possible.
  - [8] The lands so dedicated shall be monumented at all intersections with existing and proposed street lines in the same manner as required by the Map Filing Law (N.J.S.A. 45:23-9.12. as amended). All interior corners and changes in direction shall be marked with concrete posts or equivalent, as approved by the Planning Board, which are a minimum of five (5) inches square or in diameter, are set a minimum of four (4) feet into the ground and extend above the ground a minimum of four (4) feet.
- (f) All other provisions of this chapter which are applicable to lands in the LC District and which have not been specifically modified in this subsection shall also apply to lands developed under this section.

- B. Permitted accessory uses.
- (1) Private garages and carports.
  - (2) Fences, subject to the provisions of § 84-58 of this chapter.
  - (3) Private swimming pool, subject to the provisions of § 84-59 of this chapter.
  - (4) Other customary accessory uses and buildings which are clearly incidental to the principal use and building.
- C. Area, yard and building requirements. The area, yard and building requirements are as specified for this zone in the schedule of requirements in § 84-29D of this chapter.
- D. Uses requiring a conditional use permit, subject to the provisions of Article IV of this chapter.
- (1) Public utilities.
- E. Other provisions.
- (1) A minimum of eighty percent (80%) of the area of any lot utilized for a single-family use in the Land Conservation District shall be left in its natural state. It shall not be covered by any buildings, structures or paving materials. No trees, shrubbery or ground cover shall be removed, nor shall the soil or existing grade be altered, except that dead growth and debris may be removed from the parcel.
  - (2) A minimum of eighty percent (80%) of the area of any lot utilized for a permitted use other than a single-family home shall be left in its natural state unless otherwise authorized by the Planning Board during site plan review.
- F. Signs are subject to the provisions of § 84-62 of this chapter.
- G. Off-street parking is subject to the provisions of § 84-60 of this chapter.

H. Golf Course Residential Community (GCRC). [Added 5-24-1990 by Ord. No. 20-90]

- (1) Permitted uses. The following shall be permitted uses in a Golf Course Residential Community:
  - (a) Single-family dwellings.
  - (b) Public and private golf courses.
  - (c) Cluster development. Notwithstanding the provisions of § 84-38A(7), reduction of lot size shall be permitted according to the following standards and the cluster provisions of § 84-38A(7); provided, however, that wherever the following standards are inconsistent with any of the provisions of the Land Use Development and Regulations of the Township of Marlboro, constituting Chapter 84 of the Code of the Township of Marlboro, the standards set forth herein shall control:
    - [1] The minimum gross acreage of a tract or parcel of land proposed for development under the cluster development provisions of this section, inclusive of the golf course area, shall be three hundred (300) contiguous acres. The maximum gross acreage under the cluster development provision of this subsection, inclusive of the golf course area, shall be four hundred fifty (450) contiguous acres.
    - [2] The maximum number of residential building lots for each cluster development shall be computed on the basis of three hundred eighty-seven thousandths (0.387) lot per gross acre of the entire tract, inclusive of the golf course area.
    - [3] The tract or parcel of land must be serviced by either a sanitary sewer system or septic system. All single-family dwellings and the clubhouse must be serviced by a municipal water supply.

Wells can be used to service the golf course as long as the wells are metered and the total amount of water taken from all wells does not exceed five million (5,000,000) gallons per twelve-month period. Water consumption will be reported monthly to the Marlboro Township Clerk.

- [4] A minimum of one hundred (100) acres of land shall consist of land to be developed and used as a golf course and its permitted accessory uses. Said minimum land area shall either not be included within residential lots but shall be set aside and developed as a golf course and the permitted accessory uses or be included within the residential lots but be subject to an easement restricting that portion of the residential lot so included to be used and developed and maintained as part of the golf course, or any combination of the foregoing; provided, however, at least seventy-five (75) acres of said land shall not be included in the residential lots.
- [a] Easements restricting portions of the residential lots to use as a part of the golf course shall not affect more than forty percent (40%) of any lot, and said easement(s) shall be restricted in perpetuity to a conservation/open space use or golf course use.
- [b] No fences or other obstructions shall be permitted in the easement area restricted as set forth in Subsection H(1)(c)4[a] above.
- [c] Title to that portion of the tract not within a residential lot shall remain restricted in perpetuity to use as a golf course and its permitted accessory uses or as open space and shall be separately taxed.

- [d] The golf course, clubhouse and any accessory uses shall be restricted for the benefit of members and guests.
  - [e] Owners of lots in the subdivision arising out of this subsection pursuant to which a golf course is constructed shall, so long as they shall continue to be such owners, have the right of membership in and use of the golf course upon fulfilling the requirements of other users or members.
  - [f] At the time of final approval of the subdivision, a restrictive covenant, in form satisfactory to the Planning Board, shall be recorded with the County Clerk restricting in perpetuity the use of the land intended for the golf course, for such use and accessory uses only, and prohibiting development of the land in any other manner and providing that the township or any other interested party shall have the right to enforce the restrictive covenant, and providing that the owners of the residential lots created pursuant to the subdivision, so long as they shall continue such ownership, shall have the right of membership in the golf club so long as such owners shall fulfill the requirements of membership imposed upon other members.
- [5] Land area equal to forty percent (40%) of the gross area of the proposed development shall not be included in lots, but shall be offered to the Township of Marlboro for conservation, open space and/or floodplain areas, for public purposes. Land utilized for street rights-of-way may be included as part of the above forty percent (40%). All streets within the development shall be offered to the township.

- [6] As an alternative to complying with Subsection H(1)(c)5], which immediately precedes this subsection, and at the option of the developer, the developer shall donate and pay over to the township for purposes of preservation of the environment and fostering public recreational facilities, the sum of twenty thousand dollars (\$20,000.) per proposed building lot, payable ten percent (10%) at the time of preliminary approval and the balance at the time of the issuance of certificates of occupancy. Out of said sum, one thousand dollars (\$1,000.) per building lot shall be utilized to create a fund to pay for the water hookup of any dwelling existing at the time of the application for preliminary approval, which dwelling is within one hundred (100) feet of the waterline to be installed in connection with the application and which would be required to be connected to the water system installed for the Golf Course Residential Community. For existing dwellings more than one hundred (100) feet from the waterline for which water connection is not mandatory, one thousand dollars (\$1,000.) shall be utilized to pay for a hookup and to contribute toward the first one hundred (100) feet of pipe, if the owner elects to hook up to public water.
- (2) Bulk requirements for the Golf Course Residential Community.
- (a) The golf course shall include and be serviced by a main clubhouse containing not less than fifteen thousand (15,000) square feet plus twenty (20) square feet for each residential lot in the community in excess of fifty (50).
- (b) The golf course shall provide for eighteen (18) holes with a minimum of six thousand five hundred (6,500) yards and shall comply with the Professional

Golf Association (PGA) standards for a championship golf course. Only one (1) eighteen-hole Golf Course Residential Community shall be permitted in any contiguous LC Zone.

- (c) Minimum lot dimensions, minimum required yard area, building requirements and maximum percent of lot coverage for the residential lots shall be as follows:
- [1] Lot area: minimum forty thousand (40,000) square feet if serviced by sanitary sewer facilities or a minimum of fifty-five thousand (55,000) square feet if serviced by a septic system.
  - [2] Lot frontage: minimum two hundred twenty-five (225) feet for any lot which accesses onto a preexisting street and minimum one hundred sixty (160) feet for all other lots, except those lots which front on a cul-de-sac, in which case the permitted lot frontage shall be fifty (50) feet.
  - [3] Lot width: minimum two hundred twenty-five (225) feet for any lot which accesses onto a preexisting street and minimum one hundred sixty (160) feet for all other lots.
  - [4] Lot depth: minimum two hundred (200) feet.
  - [5] Front yard setback: minimum fifty (50) feet. Minimum front yard setbacks shall be seventy-five (75) feet on any lot that fronts on a preexisting street or roadway.
  - [6] Side yard setback: for principal buildings, minimum fifty (50) feet for any lot accessing onto a preexisting street and minimum forty (40) feet for all other lots; for accessory buildings, minimum thirty (30) feet.

- [7] Rear yard setback: minimum fifty (50) feet for principal building, minimum twenty-five (25) feet for accessory building, in both cases, exclusive of any golf course easement allowed pursuant to § 84-38H(1)(c)4[a] above.
  - [8] Building height: maximum thirty-five (35) feet for principal residential building and maximum fifteen (15) feet for other accessory buildings.
  - [9] Gross floor area: minimum three thousand (3,000) square feet.
  - [10] Ground floor area: minimum one thousand five hundred (1,500) square feet.
  - [11] Lot coverage: maximum impervious lot coverage twenty percent (20%).
  - [12] Pavement width: pavement width for interior streets, thirty (30) feet.
  - [13] Clubhouse parking: A minimum of one (1) parking space shall be provided for every three (3) club memberships.
- (3) Permitted accessory uses.
- (a) Accessory uses for the single-family dwellings shall be all accessory uses permitted in the LC Land Conservation District under § 84-38B.
  - (b) Accessory uses for the golf course property shall be customary accessory uses and buildings which are clearly incidental to the principal uses and buildings, including structures such as clubhouses, pro shops, locker rooms, practice ranges, putting greens, tennis courts, swimming pools, lounges and dining facilities incorporated within the main clubhouse and refreshment facilities incorporated in the golf course which are incidental to and subordinate to the operation of a golf course.

- (4) Contributions for off-tract improvements. As a condition of final subdivision and site plan approval, an applicant may be assessed in accordance with § 84-118 of the Land Use Development Ordinance of Marlboro.
- (5) Signs. Project entry and identification signs and signs permitted per § 84-62 of this chapter are permitted.
- (6) Parking. Parking is permitted as provided in Subsection (2)(c)(13) above and otherwise as per § 84-60 of this chapter.
- (7) Fences. Fences are permitted as per § 84-58 of this chapter, except as provided in Subsection (1)(c)(4)(b) above.
- (8) Phasing. Prior to the issuance of the first certificate of occupancy for a residential unit in the Golf Course Residential Community, the first nine (9) holes of the golf course must be developed up through and including being seeded. The first nine (9) holes shall be completed and ready for play within twelve (12) months of the completion of the seeding. A clubhouse facility, consisting of at least seven thousand five hundred (7,500) square feet, shall also be completed prior to the issuance of the first certificate of occupancy for a residential unit being issued. Construction of the second nine (9) holes of the golf course shall commence prior to the issuance of building permits for any of the final fifty percent (50%) of the total number of residential units approved as part of the Golf Course Residential Community. The second nine (9) holes of the golf course must be developed up through and including being seeded and all other amenities required for the golf course shall be completed prior to the issuance of a certificate of occupancy for any of the final fifty percent (50%) of the total number of residential units approved as part of the Golf Course Residential Community. The second nine (9) holes shall be completed and ready for play within twelve (12) months of the completion of the seeding. Certificates of occupancy of no more than ninety percent (90%) of the proposed residential lots

shall be issued until all the golf course facilities, including all eighteen (18) holes, have been installed and completed, and all buildings associated with the golf course, including but not limited to the clubhouse, shall have been completed and certificates of occupancy relating to them shall have been issued.

**§ 84-39. R-80 Residential District.**

The following regulations shall apply in the R-80 Residential District:

**A. Permitted uses.**

- (1) Single-family dwellings.
- (2) Temporary buildings for uses incidental to construction work, provided such buildings are removed upon completion or abandonment of the construction work.

**B. Permitted accessory uses.**

- (1) All accessory uses permitted in the LC Land Conservation District under § 84-38B.

**C. The area, yard and building requirements are as specified for this zone in the schedule of requirements in § 84-29D of this chapter.**

**D. Uses requiring a conditional use permit, subject to the provisions of Article IV of this chapter.**

- (1) Churches and places of worship.
- (2) Public utilities.
- (3) Hospitals, philanthropic or eleemosynary uses.
- (4) Quasi-public buildings and recreation areas.
- (5) Commercial swimming pools and swimming clubs.
- (6) Home professional offices and home occupations.

## APPENDIX 6

### LIST OF AGENCIES AND ORGANIZATIONS

# LIST OF AGENCIES

## OCEAN COUNTY

### AUDIO-VISUAL AIDS COMMISSION

350 Chambers Bridge Road  
Brick, NJ 08723  
(908) 477-3342

### BOARD OF CHOSEN FREEHOLDERS

Administration Building  
CN 2191  
Toms River, NJ 08754  
(908)929-2005

### CHAMBER OF COMMERCE

611 Main Street  
Toms River, NJ  
(908) 349-0220

### BARNEGAT CHAMBER OF COMMERCE

P.O. Box 362  
Barnegat, NJ 08005  
(609) 597-4244

### BRICK TOWNSHIP CHAMBER OF COMMERCE

1673 Route 88W  
Brick, NJ 08724  
(908) 458-4949

### GREATER POINT PLEASANT CHAMBER OF COMMERCE

517-A Arnold Avenue  
Point Pleasant, NJ 08742  
(908) 899-2424

### JACKSON TOWNSHIP CHAMBER OF COMMERCE

P.O. Box A.C.  
Jackson, NJ 08527  
(908) 367-4002

### LACEY TOWNSHIP CHAMBER OF COMMERCE

103 Route 9  
P.O. Box 306  
Forked River, NJ 08731  
(609) 693-8312

**OCEAN COUNTY (cont.)**

LAKESWOOD TOWNSHIP CHAMBER OF COMMERCE  
P.O. Box 656  
Second Street & Clifton Avenue  
Lakewood, NJ 08701  
(908) 363-0012

SOUTHERN OCEAN COUNTY CHAMBER OF COMMERCE  
265 Ninth Street  
Ship Bottom, NJ 08008  
(609) 494-7211

TOMS RIVER-OCEAN COUNTY CHAMBER OF COMMERCE  
2700 Hooper Avenue  
Toms River, NJ 08753  
(908) 349-0220

COLLEGE  
College Drive  
Toms River, NJ 08753  
(908) 255-4000

COUNTY OF OCEAN  
Administration Building  
CN 2191  
101 Hooper Avenue  
Toms River, NJ 08754  
(908) 244-2121

ENGINEERING DEPARTMENT  
Court House Annex  
Toms River, NJ 08754  
(908) 929-2130

ENVIRONMENTAL AGENCY  
Extension Center  
1623 Whitesville Road  
Toms River, NJ 08755-9720  
(908) 349-1227

BARNEGAT ENVIRONMENTAL COMMISSION  
900 West Bay Avenue  
Barnegat, NJ 08005  
(609) 698-7832

**OCEAN COUNTY (cont.)**

BAY HEAD ENVIRONMENTAL COMMISSION  
P.O. Box 248  
Bay Head, NJ 08742  
(908) 892-0636

BERKELEY ENVIRONMENTAL COMMISSION  
P.O. Box B  
Bayville, NJ 08721  
(908) 244-7400

BRICK ENVIRONMENTAL COMMISSION  
401 Chambers Bridge Road  
Brick, NJ 08723  
(908) 477-3000

DOVER ENVIRONMENTAL COMMISSION  
33 Washington Street  
P.O. Box 728  
Toms River, NJ 08754  
(908) 341-1000

EAGLESWOOD ENVIRONMENTAL COMMISSION  
146 Division Street  
West Creek, NJ 08092  
(609) 296-3040

JACKSON ENVIRONMENTAL COMMISSION  
RD 4, Box 1000  
Jackson, NJ 08527  
(908) 928-1200

LACEY ENVIRONMENTAL COMMISSION  
818 W. Lacey Road  
Forked River, NJ 08731  
(609) 693-1100

LAKESWOOD ENVIRONMENTAL COMMISSION  
231 Third Street  
Lakewood, NJ 08701  
(908) 364-2500

LAVALLETTTE ENVIRONMENTAL COMMISSION  
P.O. Box 67  
Lavallette, NJ 08735  
(908) 793-7477

## OCEAN COUNTY (cont.)

LITTLE EGG HARBOR ENVIRONMENTAL COMMISSION  
7 Gifford Road  
Little Egg Harbor, NJ 08087  
(609) 296-7241

MANCHESTER ENVIRONMENTAL COMMISSION  
1 Colonial Drive  
Lakehurst, NJ 08733  
(908) 657-8121

OCEAN ENVIRONMENTAL COMMISSION  
50 Railroad Avenue  
Waretown, NJ 08758  
(609) 693-3302

OCEAN GATE ENVIRONMENTAL COMMISSION  
P.O. Box 100  
151 E. Longport Avenue  
Ocean Gate, NJ 08740  
(908) 269-3171

POINT PLEASANT ENVIRONMENTAL COMMISSION  
P.O. Box 25  
2223 Bridge Avenue  
Point Pleasant, NJ 08742  
(908) 892-3434

STAFFORD ENVIRONMENTAL COMMISSION  
775 E. Bay Avenue  
Manahawkin, NJ 08050  
(609) 597-1061

SURF CITY ENVIRONMENTAL COMMISSION  
813 Long Beach Boulevard  
Surf City, NJ 08008  
(609) 494-3064

HEALTH DEPARTMENT  
Sunset Avenue  
Toms River, NJ 08754  
(908) 341-9700

LIBRARY  
101 Washington Street  
Toms River, NJ 08753  
(908) 349-6200

**OCEAN COUNTY (cont.)**

**MOSQUITO EXTERMINATION COMMISSION**

P.O. Box 327  
West Bay Avenue  
Barnegat, NJ 08005  
(609) 698-8271

**PARKS & RECREATION DEPARTMENT**

1198 Brandon Road  
Toms River, NJ 08753  
(908) 506-9090

**COOPER NATURE CENTER**

Cattus Island County Park  
1170 Cattus Island Boulevard  
Toms River, NJ 08753  
(908) 270-6960

**WELLS MILLS NATURE CENTER**

Wells Mills County Park  
Route 532  
Waretown, NJ 08758  
(609) 971-3085

**PLANNING BOARD**

119 Hooper Avenue  
Toms River, NJ 08754  
(908) 929-2054

**PUBLIC TRANSPORTATION**

119 Hooper Avenue  
Toms River, NJ 08754  
(908) 929-2054

**RUTGERS COOPERATIVE EXTENSION**

1623 Whitesville Road  
Toms River, NJ 08755  
(908) 349-1227  
Agricultural Agent  
(908) 349-1245

**SHADE TREE COMMISSION**

Court House Annex  
Toms River, NJ 08754  
(908) 929-2130

## **OCEAN COUNTY (cont.)**

### **SOIL CONSERVATION DISTRICT**

714 Lacey Road  
Forked River, NJ 08731  
(908) 971-7002

### **TRAFFIC DIVISION**

Maple Tree Road  
Toms River, NJ 08754  
(908) 349-8165

### **TOURISM ADVISORY COUNCIL**

Economic and Industrial Development  
Administration Building  
Toms River, NJ 08754  
(908) 929-4718

### **UTILITIES AUTHORITY**

501 Hickory Lane  
P.O. Box P  
Bayville, NJ 08721  
(908) 269-4500

## **STATE OF NEW JERSEY**

### **DEPARTMENT OF COMMERCE**

#### **TRAVEL AND TOURISM**

CN 826  
20 West State Street  
Trenton, NJ 08625  
(609) 292-2470

### **DEPARTMENT OF COMMUNITY AFFAIRS**

CN 800  
101 South Broad Street  
Trenton, NJ 08625  
(609) 633-3795

### **DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ENERGY (DEPE)**

#### **BUREAU OF EMERGENCY RESPONSE**

300 Horizon Center  
Route 130 South  
Robbinsville, NJ 08691  
(609) 584-4132

**STATE OF NEW JERSEY (cont.)**

**BUREAU OF MONITORING MANAGEMENT**  
CN 029  
35 Arctic Parkway  
Trenton, NJ 08625  
(609) 292-0427

**CLEAN COMMUNITIES PROGRAM**  
**STREET AND STORM DRAIN GRANTS**  
CN 414  
840 Bear Tavern Road  
West Trenton, NJ 08625  
(609) 530-8593

**COMMUNICATIONS**  
CN 402  
401 E. State Street  
Trenton, NJ 08625  
(609) 292-3225

**DIVISION OF FISH, GAME & WILDLIFE**  
CN 400  
501 E. State Street  
Trenton, NJ 08625  
(609) 292-2965

**DIVISION OF PARKS & FORESTRY**  
CN 404  
501 E. State Street  
Trenton, NJ 08625  
(609) 292-2797

**BARNEGAT LIGHTHOUSE STATE PARK**  
P.O. Box 167  
Barnegat Light, NJ 08006  
(609) 494-2016

**ISLAND BEACH STATE PARK**  
P.O. Box 37  
Seaside Park, NJ 08752  
(908) 793-0506

**DIVISION OF SCIENCE AND RESEARCH**  
CN 409  
401 E. State Street  
Trenton, NJ 08625  
(609) 984-6070

**STATE OF NEW JERSEY (cont.)**

**ENGINEERING AND CONSTRUCTION ELEMENT**

1510 Hooper Avenue  
Toms River, NJ 08753  
(908) 255-0774

**ENFORCEMENT**

CN 029  
401 E. State Street  
Trenton, NJ 08625  
(609) 984-3285  
(908) 255-0787 (Toms River)

**GREEN ACRES**

CN 412  
1230 Whitehorse-Mercerville Road  
Trenton, NJ 08625  
(609) 588-3450

**LAND USE REGULATION PROGRAM**

CN 401  
501 E. State Street  
Trenton, NJ 08625-0401  
(609) 984-3444

**NATURAL & HISTORIC RESOURCES**

CN 402  
501 E. State Street  
Trenton, NJ 08625  
(609) 292-3541

**NEW JERSEY TIDELANDS RESOURCE COUNCIL**

9 Ewing Street  
CN 401  
Trenton, NJ 08625  
(609) 292-2573

**NEW JERSEY WASTEWATER TREATMENT TRUST**

CN 029  
1333 Brunswick Circle  
Trenton, NJ 08625  
(609) 292-3998

**STATE OF NEW JERSEY (cont.)**

OFFICE OF ENVIRONMENTAL SERVICES  
MATCHING GRANT PROGRAM  
CN 402  
401 E. State Street  
Trenton, NJ 08625  
(609) 984-0828

OFFICE OF LAND AND WATER PLANNING  
COASTAL MANAGEMENT PROGRAM  
CN 423  
401 E. State Street  
Trenton, NJ 08625  
(609) 292-2113

SCIENCE AND TECHNICAL PROGRAMS  
BUREAU OF MARINE WATER CLASSIFICATION AND ANALYSIS  
P.O. Box 405  
Stoney Hill Road  
Leeds Point, NJ 08220  
(609) 748-2000

**DEPARTMENT OF LAW AND PUBLIC SAFETY**

BOAT REGULATION COMMISSION  
New Jersey State Police  
Marine Law Enforcement Bureau  
P.O. Box 7068  
West Trenton, NJ 08625-0068  
(609) 882-2000

DIVISION OF MOTOR VEHICLES SERVICES  
CN 160  
25 South Montgomery Street  
Trenton, NJ 08625  
(609) 292-4570

NEW JERSEY STATE POLICE  
MARINE LAW ENFORCEMENT BUREAU  
P. O. Box 7068  
West Trenton, NJ 08625-0068  
(609) 882-2000

STATE ATTORNEY GENERAL'S OFFICE  
CN 081  
Hughes Justice Complex  
Trenton, NJ 08625  
(609) 292-8740

**STATE OF NEW JERSEY (cont.)**

**DEPARTMENT OF TRANSPORTATION**

CN 600  
1035 Parkway Avenue  
Trenton, NJ 08625  
(609) 530-3535

**NEW JERSEY HIGHWAY AUTHORITY**

Garden State Parkway  
Woodbridge, NJ 07095  
(908)442-8600

**NEW JERSEY LEGISLATURE**

State House Annex  
Trenton, NJ 08625  
(800) 792-8630  
(609) 292-4840

**NEW JERSEY NATURAL LANDS TRUST**

501 E. State Street  
CN 402  
Trenton, NJ 08625  
(609) 984-1339

**NEW JERSEY PINELANDS COMMISSION**

P.O. Box 7  
15 Springfield Road  
New Lisbon, NJ 08064  
(609)894-9342

**OFFICE OF STATE PLANNING**

150 West State Street  
CN 204  
Trenton, NJ 08625  
(609) 292-7156

**PUBLIC ADVOCATE**

CN 850  
Hughes Justice Complex  
Trenton, NJ 08625  
(609) 292-0770

**UNITED STATES**

**ARMY CORPS OF ENGINEERS**  
Philadelphia District  
Second & Chestnut Streets  
Philadelphia, PA 19106  
(215) 597-4723

**DEPARTMENT OF AGRICULTURE**  
**SOIL CONSERVATION SERVICE**  
NJ State Office  
1370 Hamilton Street  
Somerset, NJ 08873  
(908) 246-1662

Ocean County Field Office  
714 Lacey Road  
Forked River, NJ 08731  
(609) 971-3316

**DEPARTMENT OF TRANSPORTATION**  
400 7th Street, SW  
Washington, DC 20590  
(202) 366-5580

**ENVIRONMENTAL PROTECTION AGENCY**  
Region II  
26 Federal Plaza, RM 402  
New York, NY 10007  
(212) 264-2525

**FEDERAL EMERGENCY MANAGEMENT AGENCY**  
**NATIONAL FLOOD INSURANCE PROGRAM**  
Region II  
26 Federal Plaza, RM 1338  
New York, NY 10007  
(212) 225-7209

**FISH AND WILDLIFE SERVICES**  
One Gateway Center  
Suite 700  
Newton, MA 02158

927 N. Main Street, Bldg. D  
Pleasantville, NJ 08232  
(609) 646-9310

## UNITED STATES CON'T

DIVISION OF ECOLOGICAL SERVICES  
P.O. Box 534  
700 White Horse Pike  
Absecon, NJ 08201  
(609) 646-9310

Edwin B. Forsyth National Wildlife Refuge  
Barnegat Division  
P.O. Box 544  
Barnegat, NJ 08005  
(609) 698-1387

Brigantine Division  
P.O. Box 72  
Oceanville, NJ 08231  
(609) 652-1665

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)  
1825 Connecticut Avenue, NW  
Suite 706  
Universal Building South  
Washington, DC 20235  
(202) 606-4152

UNITED STATES COAST GUARD  
Governor's Island  
Building 135A  
New York, NY 10004  
(212) 264-8341

## ASSOCIATIONS

ALLIANCE FOR A LIVING OCEAN  
P.O. Box 95  
Ship Bottom, NJ 08008  
(609) 494-0222

ALLIANCE FOR NEW JERSEY ENVIRONMENTAL EDUCATION (ANJEE)  
Box 693  
Bernardsville, NJ 07924  
(908) 766-5787

## **ASSOCIATIONS (cont.)**

### **AMERICAN LITTORAL SOCIETY**

Sandy Hook  
Highlands, NJ 07732  
(908) 291-0055

### **ASSOCIATION OF NEW JERSEY ENVIRONMENTAL COMMISSIONS (ANJEC)**

300 Mendham Road  
P.O. Box 157  
Mendham, NJ 07945  
(201) 539-7547

### **BOY SCOUT COUNCIL**

P.O. Box 1247  
Toms River, NJ 08753  
(908) 349-1037

### **CITIZENS CONSERVATION COUNCIL OF OCEAN COUNTY**

220 Virginia Drive  
Brick, NJ 08723  
(908) 477-1339

### **CLEAN OCEAN ACTION**

P.O. Box 505  
Sandy Hook-Highlands, NJ 07732  
(908) 872-0111

### **ENVIRONMENTAL EDUCATION NETWORK**

127 Cardinal Drive  
Toms River, NJ 08755  
(908) 341-4957

### **GERALDINE R. DODGE FOUNDATION, INC.**

95 Madison Avenue  
Morristown, NJ 07962-1239  
(201) 540-8442

### **GIRL SCOUT COUNCIL**

1405 Old Freehold Road  
Toms River, NJ 08753  
(908) 349-4499

### **IZAAK WALTON LEAGUE**

Ocean County Chapter  
P.O. Box 668  
Mantoloking, NJ 08738  
(908) 892-3465

## ASSOCIATIONS (cont.)

### JERSEY COAST ANGLERS ASSOCIATION

P.O. Box 111  
Spring Lake, NJ 07762  
(908) 506-6409

### JERSEY SHORE AUDUBON SOCIETY

P.O. Box 1800  
Point Pleasant Beach, NJ 08742  
(908) 928-9117

### JOYCE FOUNDATION GRANTS

135 S. LaSalle Street  
Suite 4010  
Chicago, IL 60603-4886  
(312) 782-2464

### LONG BEACH ISLAND CONSERVATION SOCIETY

Barneгат Light, NJ 08006  
(609) 494-2096

### MARINE MAMMAL STRANDING CENTER

P.O. Box 773  
Brigantine, NJ 08203  
(609) 266-0538

### MARINE TRADE ASSOCIATION OF NEW JERSEY

P.O. Box 218  
Rumson, NJ 07760  
(908) 530-0635

### MID-ATLANTIC COUNCIL OF WATERSHED ASSOCIATIONS

2955 Edge Hill Road  
Huntingdon Valley, PA 19006

### NATURE CONSERVANCY

New Jersey Field Office  
17 Fairmount Road  
Pottersville, NJ 07979  
(908) 439-3007

### NEW JERSEY AUDUBON SOCIETY

P.O. Box 125  
Franklin Lakes, NJ 07417  
(201) 891-1211

## **ASSOCIATIONS (cont.)**

**NEW JERSEY CONSERVATION FOUNDATION**  
300 Mendham Road  
Morristown, NJ 07960  
(201) 539-7540

**NEW JERSEY FEDERATION OF PLANNING OFFICIALS**  
66 Morris Avenue  
P.O. Box 359  
Springfield, NJ 07081  
(201) 379-1100

**NEW JERSEY FEDERATION OF SPORTSMEN'S CLUBS**  
P.O. Box 673  
Flanders, NJ 07836-0673  
(908) 735-5046

**NEW JERSEY MARINE EDUCATION ASSOCIATION**  
Nacote Marine Lab  
P.O. Box 418  
Port Republic, NJ 08241  
(609) 748-2031

**NEW JERSEY MARINE SCIENCES CONSORTIUM**  
Sandy Hook Field Station, Bldg #22  
Fort Hancock, NJ 07732  
(908) 872-1300

**NJ SEA GRANT COLLEGE PROGRAM**  
Sandy Hook Field Station, Bldg. #22  
Fort Hancock, NJ 07732  
(908) 872-1300

**NJ SEA GRANT MARINE ADVISORY SERVICE**  
Agricultural Building  
1623 Whitesville Road  
Toms River, NJ 08755  
(908) 872-1300

**NEW JERSEY POLLUTION RESPONSE**  
P.O. Box 2485  
Trenton, NJ 08608  
(609) 396-9812

## ASSOCIATIONS (cont.)

OCEAN COUNTY CITIZENS FOR CLEAN WATER  
P.O. Box 4724  
Toms River, NJ 08754  
(908) 240-7241

OCEAN NATURE & CONSERVATION SOCIETY  
21 Winding River Drive  
Toms River, NJ 08755  
(908) 244 5722

PINELANDS INSTITUTE FOR NATURAL & ENVIRONMENTAL STUDIES  
120-13 Whitesbog Road  
Browns Mills, NJ 08015  
(609) 893-1765

PINELANDS PRESERVATION ALLIANCE  
120-34B Whitesbog Road  
Browns Mills, NJ 08015  
(609) 893-4747

SAVE OUR OCEAN COMMITTEE  
160 Pershing Boulevard  
Lavallette, NJ 08735  
(908) 793-5253

SAVE OUR SHORES  
2040 Sixth Avenue  
Neptune, NJ 07753  
(908) 775-2090

SIERRA CLUB - NEW JERSEY CHAPTER  
57 Mountain Avenue  
Princeton, NJ 08540  
(609) 924-3141

SOUTH JERSEY RESOURCE CONSERVATION & DEVELOPMENT PROGRAM  
251 Bellevue Avenue  
Hammononton, NJ 08037  
(609) 561-3223

VICTORIA FOUNDATION, INC.  
40 South Fullerton Avenue  
Montclair, NJ 07043  
(201) 783-4450

## ASSOCIATIONS (cont.)

WETLANDS INSTITUTE  
Stone Harbor Boulevard  
Stone Harbor, NJ 08247  
(609) 368-1211

WILLIAM PENN FOUNDATION  
1630 Locust Street  
Philadelphia, PA 19103  
(215) 732-5114

Y.E.S. (Youth Environmental Society)  
P.O. Box 441  
Cranbury, NJ 08512  
(609) 655-8030

APPENDIX 7

MODEL ORDINANCE FOR CREATING AN ENVIRONMENTAL COMMISSION

## ENVIRONMENTAL COMMISSION MODEL ORDINANCE

An ordinance to establish an Environmental Commission in the \_\_\_\_\_ of, \_\_\_\_\_, County of \_\_\_\_\_ and state of New Jersey.

**SECTION 1. Creation:** The municipality of \_\_\_\_\_ Environmental Commission is hereby established pursuant to Chapter 245 of the Laws of 1968 (N.J.S.A. 40:56A-1 to 40:56A-12), as amended by Chapter 35, P.L. 1972.

**SECTION 2. Members:** A Commission shall consist of seven (7) members appointed by the Mayor, one of whom shall also be a member of the Planning Board and all of whom shall be residents of the municipality of \_\_\_\_\_; the members shall serve without compensation except as hereinafter provided. The Mayor shall designate one of the members to serve as Chairman and presiding officer of the Commission. The terms of the office of the first commissioners shall be for 1, 2 or 3 years, to be designated by the Mayor in making his appointments, and their successors shall be appointed for terms of 3 years and until the appointment and qualification of their successors. The first members of the Commission shall be appointed for the following terms:

2 members for the 1-year term expiring December 31, 19\_\_.

2 members for the 2-year term expiring December 31, 19\_\_.

3 members for the 3-year term expiring December 31, 19\_\_.

The Mayor or governing body may remove any member of the Commission for cause, on written charges served upon the member and after a hearing thereon at which the member shall be entitled to be heard in person or by counsel. A vacancy on the Commission occurring otherwise than expiration of a term shall be filled for

the unexpired term in the same manner as an original appointment.

**SECTION 3. Powers of Commission:** The Commission is established for the protection, development or use of natural resources, including water resources, located within territorial limits of the municipality of \_\_\_\_\_. The Commission shall have power to conduct research into the use and possible use of the open land areas of the municipality and may coordinate the activities of unofficial bodies organized for similar purposes, and may advertise, prepare, print, and distribute books, maps, charts, plans and pamphlets which in its judgment it deems necessary for its purposes. It shall keep an index of all open areas, publicly or privately owned, including open marshland, swamps and other wetlands, in order to obtain information on the proper use of such areas and may from time to time recommend to the Planning Board plans and programs for inclusion in the Master Plan and the development and use of such areas.

**SECTION 4. Acquisitions by Commission:** The Environmental Commission may, subject to the approval of the governing body, acquire property, both real and personal, in the name of the municipality by gift, purchase, grant, bequest, devise or lease for any of its purposes and shall administer the same for such purposes subject to the terms of the conveyance or gift. Such an acquisition may be to acquire the fee or any lesser interest, development right, easement (including conservation easement), covenant or other contractual right (including a conveyance on conditions or with limitations or reversions), as may be necessary to acquire, maintain, improve, protect, limit the future use of, or otherwise conserve and properly utilize open spaces and other land and water areas in the municipality.

**SECTION 5. *Records and Annual Reports:***  
The Environmental Commission shall keep records of its meetings and activities and make an annual report to the governing body.

**SECTION 6. *Appropriations:*** The Commission may appoint such clerks and other employees and incur such expenses as it may from time to time require, providing the same shall be within the limits of funds appropriated to it by the governing body or otherwise available to it.

**SECTION 7. *Studies and Recommendations:***  
The Environmental Commission shall have power to study and make recommendations concerning open space preservation, water resources management, air pollution control, solid waste management, noise control, soil and landscape protection, environmental appearance, marine resources and protection of flora and fauna.

**SECTION 8.** This Ordinance shall take effect immediately upon its passage and publication according to law.

\_\_\_\_\_, Mayor

Passed first reading: \_\_\_\_\_ 19\_\_.

Passed and approved: \_\_\_\_\_ 19\_\_.

**SOURCE: Environmental Commissioners' Handbook. N.J. Department of Environmental Protection and Association of New Jersey Environmental Commissions, 1990.**

**APPENDIX 8**

**MODEL ORDINANCE FOR PLAN REVIEW**

## Article IX. Review and Approval Procedures

### Section \_\_: Purpose.

The purpose of this article is to provide procedures for the review and approval of applications for subdivisions, site plans and general development plans in \_\_\_\_\_ Township.

### Section \_\_: Informal reviews.

#### A. Applicability.

Nothing in this section shall be considered mandatory but the procedures provided for herein are recommended for the purpose of expediting the review process and reducing development costs.

#### B. Pre-application conference.

1. Any developer may meet with the Administrative Officer or his/her designee without the payment of any fees and without obligation.
2. A pre-application conference may be used to provide the developer with an overview of the substantive and procedural aspects of the development review process, to provide insight as to the acceptability of the proposed plan, and to offer suggestions for the improvement of said plan.
3. The developer may be required to secure an appointment with the Administrative Officer in advance of the pre-application conference and to submit a sketch plan of the proposed application. The conference shall be held within fourteen (14) days of requesting an appointment unless the Administrative Officer is unavailable because of illness, vacation, or similar reason.
4. For the purpose of the pre-application conference only, the sketch plan need not be drawn to scale nor be prepared by a licensed engineer, surveyor, architect, landscape architect, or planner but shall contain sufficient information from a tax map or other source to enable the Administrative Officer to determine the suitability of the proposal in relation to the standards of this chapter.
5. The pre-application conference is a good-faith meeting between the developer and the Administrative Officer. Nothing discussed at the conference shall be binding upon either party or upon the Planning Board.

C. Concept plan review.

1. An applicant for site plan, subdivision or general development plan approval or an applicant having a particular question which cannot be resolved at a pre-application conference may request an informal concept plan review before the Planning Board. In addition, the applicant may request to have the concept plan reviewed by one (1) or more members of the Development Review Committee, as listed in Section \_\_: below.
2. Standards for the concept plan.
  - a. The concept plan shall be prepared by an engineer, surveyor, architect or planner who is licensed or certified by the State of New Jersey.
  - b. It shall be drawn to one of the following scales:
    - 1). One inch equals ten (10) feet.
    - 2). One inch equals twenty (20) feet.
    - 3). One inch equals thirty (30) feet.
    - 4). One inch equals forty (40) feet.
    - 5). One inch equals fifty (50) feet.
    - 6). One inch equals one hundred (100) feet.
    - 7). One inch equals two hundred (200) feet.
  - c. The concept plan shall be on paper not less than eight and one-half (8.5) inches wide by eleven (11) inches long nor more than thirty (30) inches wide by forty-two (42) inches long.
  - d. The concept plan shall contain sufficient detail to enable the reviewing officials to determine compliance with this chapter, including the area of all proposed lots and buildings and any dimensions necessary to determine zoning compliance.
  - e. Roadway and street widths shall be noted but fully engineered plans for streets, drainage, and other utility or infrastructure systems shall not be required.
  - f. The required number of concept plans to be submitted by the applicant shall be determined by the Administrative Officer, but in no case shall be less than five (5) plans.
3. The applicant shall not be required to submit any application fees for an informal concept review before the Planning Board, but shall be required to post escrow fees for the review services of the Township's professional consultants if such review is so requested by the applicant. At the conclusion of the concept review process, any unexpended escrow fees may, at the applicant's choice, be returned or credited towards required escrow fees for preliminary or final application.

4. An applicant desiring to have a concept plan informally reviewed by the Planning Board shall so notify the Secretary of the Planning Board at least fourteen (14) days prior to the next regularly scheduled meeting of the Planning Board. The Secretary of the Planning Board shall thereafter notify the applicant of the time and place which has been scheduled by the Planning Board for the informal review. The informal presentation before the Planning Board will be scheduled at the conclusion of the meeting and will be allotted fifteen (15) minutes, if time permits.
5. An applicant desiring to have a concept plan informally reviewed by any member(s) of the Development Review Committee shall so notify the Administrative Officer. The Administrative Officer will either schedule the applicant for a regularly scheduled Development Review Committee meeting (if the concept plan is submitted at least three (3) weeks prior to the regularly scheduled Development Review Committee meeting) or a specially called meeting may be set by the Administrative Officer within three (3) weeks of the concept plan submission if a mutually agreeable time may be established by all parties.
6. Nothing in the concept review process shall be binding upon either the applicant, Committee members, or the Planning Board.

Section \_\_:           **Submission, classification, and completeness of formal applications.**

- A. All formal applications for approval, including minor subdivisions and site plans, preliminary or final major subdivisions and site plans, general development plans, and conceptual use plans, shall be submitted with forms provided by the Administrative Officer. The Administrative Officer shall also provide the applicant with a copy of the checklist for completeness which is contained in Article \_\_\_\_ of this chapter. The completed application forms shall be accompanied by all required plans, supporting documentation, application fees and escrow fees for professional review.
- B. Submission standards.
  1. Plans and supporting documentation must contain all information herein required for the type of approval requested. Where there is a question as to classification of the plan, the applicant may seek advice from the Administrative Officer. Failure to provide all required information will result in the plan being declared incomplete.
  2. All applications for preliminary or final site plan approval which require public sanitary sewer or water service shall submit a receipted copy of their application for Form A approval to the \_\_\_\_\_ Municipal Utility Authority.

3. \_\_\_\_\_ copies of all plans and supporting documentation and twenty-four (24) copies of the completed application forms shall be submitted by the applicant to the Administrative Officer, where the Administrative Officer or his or her representative shall date stamp the plans upon receipt. This date shall be considered the official submission date.
- C. Upon receipt of an application, the Administrative Officer shall preliminarily screen the material and determine completeness relative to the details required by the appropriate development checklist in this chapter. The Administrative Officer shall either determine the application to be incomplete or determine that the application is substantially complete.
1. Should the Administrative Officer determine that the application is incomplete, the reasons for such determination shall be specified in writing to the applicant, and an appropriately revised plan may thereafter be submitted to the Administrative Officer as in the first instance.
  2. If the Administrative Officer determines the application to be substantially complete, the Administrative Officer shall schedule the application for the next regularly scheduled Development Review Committee meeting.
- D. The following certifications are required before an application is heard by the Development Review Committee or Planning Board.
1. All taxes due to the Township on the property for which application is made shall be paid.
  2. Sufficient monies are in the escrow account to cover the cost of professional reviews.
  3. Where applicable, the applicant shall submit a certification at the time of the Development Review Committee meeting that the plan has been submitted for review by appropriate outside agencies such as the New Jersey Department of Environmental Protection and Energy in the case of potential wetlands or stream encroachment, the \_\_\_\_\_ County Board of Health where septic systems are proposed, the \_\_\_\_\_ County Planning Board when the proposal has frontage on a county road, the New Jersey Department of Transportation when the proposal has frontage on a state highway, and any other agency as may be directed by the Administrative Officer. A final determination by these agencies shall not be required for action by the Development Review Committee or the Planning Board, but any action taken shall be conditioned upon the approval of these agencies.

Section \_\_: Development Review Committee.

- A. Prior to being heard by the Planning Board and, in some cases, the Zoning Board of Adjustment, all applications whether for preliminary, final, general development plan or conditional use approval shall be presented to the Development Review Committee for review. The Administrative Officer will determine which members of the Development Review Committee will review the application. Those members so delegated may submit oral and/or written comments regarding an application, wherein written comments shall be made available to the applicant prior to or at the meeting.
- B. The Development Review Committee may consist of the Administrative Officer, the Township Engineer, the Planning Board Engineer, the Township Planner, the Planning Board Planner, the Township Solicitor, the Planning Board Solicitor, the Construction Official, a representative of the Environmental Commission, a representative of the \_\_\_\_\_ Municipal Utility Authority, a representative of the Township Police Department, the Township Fire Marshall, and any three (3) members of the Planning Board so designated by the Planning Board Chairperson.
- C. Conduct of the Development Review Committee meeting.
  - 1. The Development Review Committee meeting is a working session between the Committee and the applicant. The meeting is used to provide the applicant with a comprehensive review of his or her application, to provide insight as to the deficiencies of the plan and to offer suggestions and recommendations for the improvement of said plan, to analyze the application to help in determining completeness, and to comment on the acceptability of the proposed plan. It is not a public hearing and need not be advertised. The meeting shall be chaired by the Administrative Officer.
  - 2. Attendance by the applicant and/or his representatives is not mandatory but is strongly encouraged.
  - 3. The members of the Development Review Committee will review an application and will offer comments to the applicant. The Administrative Officer and/or his/her representative will prepare a report of all the outstanding review issues that remain to be addressed by the applicant. The members of the Development Review Committee present for each application will informally vote on whether the application is deemed complete or incomplete and how the application will be further scheduled. Such informal vote of the Committee will be a recommendation for action by the Administrative Officer.
  - 4. An electronic sound recording or a written copy of the minutes of the meeting may be kept but, in the case of written minutes, need not be a verbatim account of the proceedings.

D. Determination and certification of completeness.

1. The Administrative Officer will refer to the recommendation of the Development Review Committee and will make a determination of completeness within forty-five (45) days of the application's official submission date.
  - a. If incomplete, the Administrative Officer shall list such missing items in writing and an appropriately revised plan may thereafter be submitted by the applicant to the Administrative Officer as in the first instance of plan submission.
  - b. If complete, the Administrative Officer will certify in writing as such to the applicant and will schedule the application as noted below in subsection E.
2. If, within forty-five (45) days of the applications's official submission date, the Administrative Officer neither certifies to the applicant that the application is complete nor notifies the applicant in writing that the application has been determined to be incomplete, then the application shall be considered certified complete and the period for action by the Board shall commence.

E. Scheduling of a complete application.

1. The Administrative Officer will refer to the recommendations of the Development Review Committee and will schedule a complete applications as follows:
  - a. If complete with major revisions needed, the Administrative Officer shall notify the applicant in writing of the date revised plans must be resubmitted for the application to be scheduled for the next regularly scheduled meeting of the Development Review Committee.
  - b. If complete with minor revisions needed, the Administrative Officer shall state the date revised plans must be resubmitted by the applicant for the application to be scheduled for the next regularly scheduled Planning Board meeting for which space is available on the agenda. In no case shall action be delayed for longer than the period prescribed by the Municipal Land Use Law unless the applicant has waived the time limits in writing or orally when the waiver is recorded by means of an electronic recording device.
  - c. If complete with no revisions needed, the Administrative Officer shall schedule the application for the next regularly scheduled Planning Board meeting for which space is available on the agenda. In no case shall action be delayed for longer than the period prescribed by the Municipal Land Use Law unless the applicant has waived the time limits in writing or orally when the waiver is recorded by means of an electronic recording device.

APPENDIX 9

SAMPLE WATERSHED ASSOCIATION BYLAWS

AMENDED AND RESTATED

BY-LAWS

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AMENDED AND RESTATED

BY - LAWS

OF UPPER RARITAN WATERSHED ASSOCIATION

Incorporated as a Non-Profit Organization under and pursuant to Title 15 of Revised Statutes of New Jersey.

ARTICLE I

PURPOSES

1.1 Purposes. The purposes for which this corporation is formed are to maintain watershed protection including soil, forest, woods, water and wildlife conservation and protection, and to promote the restoration and conservation of all the natural resources of the Upper Raritan Watershed; to conduct scientific investigations and research to aid the accomplishment of any and all of the above purposes, and to do all things suitable and appropriate to protect and improve the communities of an area within the watershed.

ARTICLE II

BOARD OF TRUSTEES

2.1 General Duties and Powers. The Board of Trustees shall have the control and management of the property, affairs and activities of the Corporation and shall exercise all such powers of the Corporation, and do all lawful acts and things necessary or expedient in the control and management thereof, as are not by statute and by the Certificate of Incorporation or by these By-laws directed or

required to be done by the members. The Board may adopt such rules and regulations for the conduct of its meetings and the management of the Corporation as it may deem proper, not inconsistent with law. The trustees shall act only as a board, and the individual trustees shall have no power as such.

2.2 Number, Qualification and Term of Office. The number of trustees shall be no less than ten nor more than forty. Each trustee must be at least eighteen years of age. Each trustee must be and remain a member in good standing of the Corporation. Within such limits, the members may determine the number of trustees which shall constitute the Board from time to time. The trustees shall be elected at the annual meeting of the members of the Corporation. Each trustee shall hold office for a term of three years and until that trustee's successor shall have been elected and shall qualify, or until that trustee's death, resignation or removal.

In the event of an increase in the number of Trustees from time to time, the term of any new trustee shall be established by lot, in order that as far as possible the terms of one-third of the trustees shall expire each year, so that at each subsequent annual meeting one-third of the trustees shall be elected to serve for a period of three years or until their successors are duly elected.

2.3 Quorum and Manner of Acting. One-third (1/3) of the number of trustees shall constitute a quorum for the transaction of business matters at any meeting, but if less than one-third (1/3) of the number is present, they may adjourn the meeting. All matters coming before the Board shall be decided by a majority vote of those present, unless otherwise required by law or by these by-laws.

2.4 Place of Meeting, etc. The Board of Trustees may hold its meetings at such place or places within or without the State of New Jersey as the Board may from time to time determine, or, in the case of special meetings, as shall be specified or fixed in the respective notices or waivers of notice thereof.

2.5 Annual Meetings. The Board of Trustees shall hold an annual meeting for the purpose of election of officers and the transaction of other activities and affairs on the day of their election or as soon thereafter as convenient, at the same place at which the annual members meeting was held or such other place as may be provided by resolution of the Board. Notice of such meeting need not be given.

2.6 Regular Meetings. Regular meetings of the Board of Trustees shall be held at such places and at such times as the Board shall from time to time determine.

2.7 Special Meetings; Notice. Special meetings of the Board of Trustees shall be held whenever called by the President or by the Secretary at the request of any five

trustees at time being in office. Notice of each such meeting shall be mailed to each trustee, addressed to the trustee at the trustee's residence or usual place of business at least twenty-four hours before the day on which the meeting is to be held or shall be sent to the trustee at such place by telegraph, cable, radio or wireless, or be given to the trustee personally or by telephone not later than the day before the day on which the meeting is to be held. Every such notice shall state the time and place of the meeting, but need not state the purposes thereof. Notice of any meeting of the Board need not be given to any trustee, however, if waived by the trustee in writing or if the trustee is present at such meeting, and does not protest prior to the conclusion of such meeting the lack of notice of such meeting.

2.8 Action Without Meetings. Unless otherwise provided by the Certificate of Incorporation or these by-laws, any action required or permitted to be taken pursuant to authorization voted at a meeting of the Board or any committee thereof may be taken without a meeting if prior or subsequent to such action, all members of the Board or of such committee, as the case may be, consent thereto in writing. Such written consent or consents shall be filed with the minutes of the Corporation.

2.9 Resignations. Any trustee of the Corporation may resign at any time by giving written notice to the President

or to the Secretary of the Corporation. Unless otherwise specified, the acceptance of such resignation shall not be necessary to make it effective. The resignation shall be effective upon receipt thereof by the Corporation or at such subsequent time as shall be specified in the notice of resignation.

2.10 Removal. Any trustee, whether chosen by the members or by the Board of Trustees may be removed from the Board, without or without cause, at any time, by the vote of two-thirds of the entire Board of Trustees (other than that Trustee).

2.11 Vacancies. Any vacancy in the Board of Trustees caused by death, resignation, removal or any other cause (including a vacancy caused by an increase in the number of trustees), may be filled by a majority vote of the remaining trustees. A trustee elected by the Board to fill a vacancy shall hold office for the unexpired term to which such vacancy relates.

2.12 Compensation of Trustees. Trustees as such shall receive no compensation for their services, however, trustees may be reimbursed for reasonable expenses in connection with their activities on behalf and for the benefit of the Corporation upon submission of signed vouchers.

2.13 Nominating Committee. The president shall, with the advice and consent of the Board, appoint a nominating

committee of three to seven members which shall recommend to the Board a slate of members to be submitted for election as trustees. The trustees shall be elected, as a slate, by the members at the annual meeting of members. Nothing herein shall prevent members from making a nomination for an alternative slate of trustees at the annual meeting.

2.14 Meeting by Telephone. A trustee on the Board or on a committee of the Board may participate in a meeting of the Board or such committee, by means of a telephone conference call or any other means of communication by which all persons participating in the meeting are able to hear each other.

2.15 Committees of the Board. The Board may create one or more committees, other than the nominating committee, of one or more trustees and one or more members. No act of any committee which has members who are not trustees shall bind the Board or the Corporation, and each act of such committee shall be advisory only and shall be subject to Board approval. The President shall appoint the members of each Committee and fill any vacancy on the Committee. Each committee, to the extent provided in the resolution, shall have and may exercise the authority of the Board, except that no such committee shall:

a. Make, alter or repeal any by-law of the Corporation; or

b. Elect or appoint any officer or trustee, or remove any officer or trustee; or

c. Make any grants or distributions of funds; or

d. Submit to members any action that requires the approval of members; or

e. Amend or repeal any resolution previously adopted by the Board.

The Board, may:

a. Abolish any such committee at its pleasure; or

b. Remove any members of such committee at any time, with or without cause.

A majority of each committee shall constitute a quorum for the transaction of business and the act of the majority of the committee members present at a meeting at which quorum is present shall be the act of such committee. Each committee shall appoint from among its members a chairman unless the President is appointing Committee members.

Actions taken at a meeting of any such committee shall be kept in a record of its proceedings which shall be reported to the Board at its next meeting following such committee meeting, except that, when the meeting of the Board is held within two days after the committee meeting, such report shall, if not made at the first meeting, be made to the Board at its second meeting following such committee meeting.

2.16 Attendance Requirements. Any trustee who fails to attend meetings of the trustees with some regularity may upon unrecorded voice vote of the remainder of the Board of Trustees, be deleted from the Board of Trustees, and as an officer, if applicable.

### ARTICLE III

#### OFFICERS

3.1 Number. The officers of the Corporation shall be a President, a Secretary, a Treasurer, and, if desired, one or more Vice Presidents and such other officers as may be designated by the Board of Trustees. One person may hold two or more offices but no officer shall execute, acknowledge or verify any instruments in more than one capacity if such instrument is required by law or these By-laws to be executed, acknowledge or verified by two or more officers.

3.2 Election, Term of Office and Qualifications. The officers shall be chosen annually by the Board of Trustees immediately after the annual meeting of the members. Each officer shall hold office until his or her successor is chosen and shall have qualified, or until the officer's death, resignation or removal in the manner hereinafter provided.

3.3 Resignations. Any officer may resign at any time by giving written notice to the Board of Trustees or to the President or to the Secretary. Unless otherwise specified,

the acceptance of such resignation shall not be necessary to make it effective. The resignation shall be effective upon receipt thereof by the Corporation or at such subsequent time as shall be specified in the notice of resignation.

3.4 Removal. Any officer chosen by the Board of Trustees may be removed from such office, either with or without cause, at any time, by the vote of two-thirds of the entire Board of Trustees (other than that officer).

3.5 Vacancies. A vacancy in any office because of death, resignation, removal or any other cause shall be filled for the unexpired portion of the term in the manner prescribed in these By-laws for election to such office.

3.6 The President. The President shall be the chief executive officer and the Chairman of the Corporation and shall have general management and direction of the activities and affairs of the Corporation, subject, however, to the control of the Board of Trustees. The President shall, in general, perform all duties incident to the office of President and such other duties as from time to time may be assigned to the President by the Board of Trustees. The President shall, when present, preside at all meetings of the Board of Trustees, and shall act as chairman at and call to order all meetings of the members. At the annual meeting of members, the President shall submit a complete report of the operations and the activities of the Corporation for the previous fiscal year, together with a statement of the

Corporation's affairs at the close of such year. The President shall also report to the Board from time to time all significant matters coming to the President's notice relative to the interests of the Corporation.

3.7 The Vice Presidents. At the request of the President, or in case of the President's absence or inability to act, a Vice President shall act in the President's place, and; in that capacity, the Vice President shall have and exercise all the powers and duties of the President. Vice Presidents shall have such other powers and perform such other duties as may, from time to time, be assigned to them by the board of Trustees or by the President.

3.8 The Secretary. The Secretary shall attend all meetings of the Board of Trustees and of the members and shall record all votes and the minutes of all proceedings in a book or books provided for that purpose. The Secretary shall see that all notices are duly given in accordance with the provisions of these By-laws and as required by law. The Secretary shall be custodian of the records and of the seal of the Corporation and see that the seal is affixed to all documents, the execution of which on behalf of the Corporation under its seal is duly authorized in accordance with the provisions of these By-laws; and, in general, shall perform all duties incident to the office of the Secretary and such other duties as may, from time to time, be assigned

to the Secretary by the Board of Trustees or by the President. The Secretary shall also make such reports to the Board of Trustees as may be requested and shall prepare and cause to be filed such reports and statements as may be required by the laws of the State of New Jersey.

3.9 The Treasurer. The Treasurer shall be the financial officer of the Corporation; shall keep full and accurate accounts of receipts and disbursements in books belonging to the Corporation; shall have charge and custody of and be responsible for all funds of the Corporation and deposit all such funds in the name of the Corporation in such banks, trust companies or other depositories as shall be selected by the Board of Trustees, and shall give a full report of the financial condition of the Corporation at the annual meeting of the members, if called upon to do so; shall receive and give receipts for moneys due and payable to the Corporation from any source whatsoever; and, in general, shall perform all the duties incident to the office of Treasurer, and such other duties as from time to time may be assigned to the Treasurer by the Board of Trustees or by the President. No bond need be given by the Treasurer.

3.10 The Assistant Officers. Assistant treasurers, if elected, shall have such duties and possess such authority as may be delegated to them by the treasurer. Assistant secretaries, if elected, shall have such duties and possess such authority as may be delegated to them by the secretary.

3.11 Compensation of Officers. The Officers shall perform their respective duties without compensation, however trustees may be reimbursed for reasonable expenses in connection with their activities on behalf and for the benefit of the Corporation upon submission of signed vouchers.

3.12 Absence of Officer. In case of the absence of any officer of the Association or for any other reason which may seem sufficient to the Board, the Board of Trustees may delegate the powers and duties of any officer for the time being to any other officer or to any Trustee.

#### ARTICLE IV

##### MEETINGS

4.1 Annual Meeting. The annual meeting of the members of the Corporation shall be held on the third Thursday of April of each year at such hour and at such place as the Board of Trustees shall set and declare, unless such date shall fall upon a legal holiday, in which case, the annual meeting shall be held on the next succeeding business day.

4.2 Notice. All members shall be given at least 10 days' notice in writing of the annual and any special meeting of members of the Corporation.

4.3 Place of Meeting. All meetings of the members shall be held at the principal office of the Corporation or at such other places as may from time to time be designated

by the Board of Trustees and specified in the respective notices of the meeting or waivers of notice thereof.

4.4 Regular Meetings. Regular meetings of the members shall be held at such places and at such times as the members shall from time to time determine. Notice of regular meetings need not be given.

4.5 Special Meetings. Special meetings of the members of the Corporation may be called at any time by the Board of Trustees or by the President. Notice of each such meeting shall set forth the general purpose of said meeting.

4.6 Organization of Meeting. The President, or in the absence of the President, the Vice President or in the absence of the President and the Vice President, a chairman designated by the members, shall preside at every meeting of members. The Secretary of the Corporation shall act as Secretary of the meeting, or in the absence of the Secretary, the presiding officer shall appoint a temporary secretary of the meeting. The Secretary of the meeting shall keep a faithful record of the proceedings thereat, and if not the Secretary of the Corporation, shall immediately turn over such record to the Secretary of the Corporation.

4.7 Voting. At all meetings of the members, each member entitled to vote thereat, and present at the meeting in person or by proxy, shall be entitled to one vote, and the vote of a majority of the members voting shall control on any question brought before such meeting, unless

otherwise provided by law, the Certificate of Incorporation or by these By-laws. At each meeting of the members, a full, true and complete list, in alphabetical order, of all members entitled to vote at such meeting, certified by the Secretary or by the Treasurer, shall be furnished. Only the persons who are members, as evidenced by the list of the members so furnished, shall be entitled to vote in person or by proxy.

4.8 Order of Business. The order of activities at all meetings of the members, unless changed by a majority vote, shall be as follows:

1. Proof of notice of meeting or waiver of notice.
2. Reading of Minutes of preceding meeting.
3. Reports of officers.
4. Reports of committees, if any.
5. Selection of inspectors of election, if any.
6. Election of trustees, if any.
7. Unfinished business.
8. New business.
9. Adjournment.

## ARTICLE V

### MEMBERSHIP

5.1 Membership. Members of the Association shall consist of persons who subscribe to the purpose of the Association, as set forth in Article Second of the Certificate of Incorporation, and Article First of these By-laws, who participate in any of the activities of the Corporation and who pay the membership fee and annual dues.

5.2 Application. Candidates for membership in the Association shall make application, subscribing to the

purposes of the Corporation and requesting that his or her name be considered for membership. Such application shall be subject to approval by the Board of Trustees. Upon payment of the annual dues for the current calendar year, the applicant shall become a member in good standing of the Association.

5.3 Vote. All members shall be entitled to vote at the annual meeting of the Corporation and for the election of Trustees. Each member shall be entitled to one vote.

5.4 Removal. Any member of the Corporation may have his membership terminated or suspended, for conduct unbecoming a good citizen, or violating any of the By-laws of the Corporation, after hearing, by a majority vote of the members of the Board of Trustees. There must, however, be 2/3rds of the members of the Board present and voting who vote for such termination of membership, or suspension.

5.5 Resignation. Any member may resign at any time by notice to the Board of Trustees.

## ARTICLE VI

### CONTRACTS, CHECKS, NOTES, ETC.

6.1 Execution of Contracts, Checks, Notes, Etc. All contracts and all checks, drafts, notes, bonds, bills of exchange, order for the payment of money, and deeds, unless otherwise directed by the Board of Trustees, or unless otherwise required by law, shall be signed by the President or Treasurer. The Board of Trustees may designate officers

and employees of the Corporation other than those named above, or combinations of officers and employees, who may, in the name of the Corporation execute contracts, checks, drafts and orders for the payment of money in its behalf.

## ARTICLE VII

### MISCELLANEOUS

7.1 Seal. The Board of Trustees shall provide a corporate seal which shall be in the form of a circle and shall bear the name of the Corporation and words and figures indicating the year and state in which the Corporation was incorporated.

7.2 Fiscal Year. The fiscal year of the Corporation shall be as determined by the Board of Trustees from time to time.

7.3 Amendments. These by-laws may be amended, altered, repealed or added to in any manner not inconsistent with the laws of New Jersey, or the provisions of the Certificate of Incorporation, by vote of two-thirds (2/3) of the trustees present at any annual or regular meeting of the Board, or at any special meeting; provided that in all cases, a notice of such proposed amendment, alteration, repeal or addition shall have been clearly given in the notice of such meeting or shall have been waived by all the trustees in writing, or by the affirmative vote of the members entitled to vote, at any regular or special meeting of the members, provided notice of such proposed amendment,

alteration, repeal or addition shall have been given in the notice of such meeting; provided, further, that by-laws made by the Board of Trustees shall be subject to amendment, alteration, repeal or addition by the members.

SOURCE: Upper Raritan Watershed Association, Gladstone, N.J.

APPENDIX 10

DESCRIPTION OF DELAWARE RIVER KEEPER PROGRAM

## Report Pollution and Other Threats

If you see pollution, large numbers of dead fish or birds, waters muddied from run-off, if you smell chemicals or sewage, if you see suspicious wetland fills occurring, if you see dumping of waste materials into a stream or alongside a stream bank, **report it immediately:**

1. Record time, date, precise location and details of the problem. Photos can be very helpful.
2. Call the pollution emergency hotline in your state:  
**Delaware 800-662-8802 (out of state: 302-739-5072)**  
**New Jersey 609-292-7172**  
**Pennsylvania 800-541-2050 (out of state: 717-787-5027)**
3. Record the time of call and the name of the operator who took your call.
4. Call 1-800-8-DELAWARE. We will follow through.

## Facts about the Delaware River

**Length:** 330 miles from Hancock, NY to the mouth of Delaware Bay

**Watershed Area:** 12,765 square miles in four states: Delaware: 8%; New Jersey: 23%; New York: 19%; Pennsylvania: 50%

**Major fish species:** The Upper Delaware provides some of the finest trout fishing in the entire United States. Important estuary species include weakfish, bluefish, flounder, American shad, Atlantic sturgeon, menhaden, and striped bass.

**Major crustacea:** Blue crab, horseshoe crab, lobster, hermit crab

**Marine mammals:** Dolphin, harbor seal, occasional whales

**Marine turtles:** Diamondback terrapin, loggerhead, green turtle, leather head

**Bird species:** About 350 watershed wide. Delaware Bay is the largest spring staging site in eastern north American for shorebirds. Bald eagles nest in the Upper Delaware and in the Bay.

**Up to 900 million gallons of water** per day are diverted to New York City and Northern New Jersey to meet one-half of the fresh water demands of 17 million people in New York and Northern New Jersey.

**Industrial Uses:** The Delaware Estuary has the largest concentration of chemical companies in the world, and the second largest concentration of petrochemical plants in the United States.

## THE DELAWARE RIVER

*...its weakfish are vanishing... some of its fish are too contaminated to eat... toxics pour into it every day...*



WHAT CAN YOU DO?

# JOIN THE DELAWARE RIVERKEEPER NETWORK

Add your watchful eyes and needed hands to the citizen team that regularly patrols and monitors the Delaware River.

Whether you're on foot, in your canoe, boat or even in your plane, you can help protect the living waters of the Delaware. **Be a Riverkeeper.**

...watch for signs of pollution

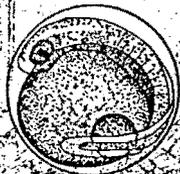
...monitor algae and storm events

...record and report sightings of wildlife species

...perform water chemistry tests

...call the Riverkeeper hotline when you see oil spills, fish or bird kills, floating sewage, etc.

Citizen monitoring helps agencies and private citizens enforce environmental laws. It provides essential information for managing human impact on the Delaware River ecosystem, with the aim of restoring depleted species and damaged habitat.



Weak fish egg

## Report Spills and Other Threats 1-800-8-DELAWARE

Delaware Riverkeeper Network

**The Delaware has a full-time Riverkeeper...**

...who has been working in the river's interest since 1988. Her job is to help protect the river and its tributaries from the headwaters in the Catskills to the mouth of Delaware Bay. The Riverkeeper is a watchdog, writer, speaker, advocate, litigator and negotiator for the Delaware River and its habitat.

Riverkeeper network volunteers report their findings to the Delaware Riverkeeper, who

maintains an independent data base on water quality sampling done at network monitoring sites

publicizes findings to decision makers and citizen groups

provides violations data to public agencies

### Delaware Riverkeeper Project

The Delaware Riverkeeper is a project of the American Littoral Society (ALS), a national non-profit organization dedicated to the protection of the water environment.

The Riverkeeper works out of the office of ALS's Delaware Valley affiliate, the Watershed Association of the Delaware River, located at P.O. Box 753, Lambertville, NJ 08530.

### Project Staff

Cynthia Poten  
Delaware Riverkeeper 609-397-3077  
Hank Snyder  
Volunteer Coordinator 609-397-4410

### Law Clinic Affiliation

The Widener University Environmental Law Clinic in Wilmington, DE assists the Delaware Riverkeeper and ALS in prosecuting Delaware River violators of the Clean Water Act.

### Funding

The Delaware Riverkeeper Network is funded by ALS and initial grants from the William Penn Foundation and the Geraldine R. Dodge Foundation.

Yes, I will help keep the Delaware safe from pollution and other threats.

I am interested in:

- Water chemistry testing
- Pollution surveillance
- Documenting species habitat, storm events and stream data
- Boatwatch
- Other (specify):

Name \_\_\_\_\_

Phone \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

Please sign me up as a member of the American Littoral Society, sponsor of the Delaware Riverkeeper Project. I'll receive ALS publications and all the Delaware River publications. Here's my check for \$25.

Enclosed is a tax-deductible contribution of \_\_\_\_\_ in support of the Delaware Riverkeeper Network.

Makes checks payable to American Littoral Society

APPENDIX 11

ENVIRONMENTAL COMMISSION GRANT

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ENERGY  
OFFICE OF ENVIRONMENTAL SERVICES  
CN 402  
TRENTON, NEW JERSEY 08625  
(609) 984-0828

## **MATCHING GRANTS PROGRAM**

### **PROCEDURAL GUIDE**

#### **OBJECTIVE**

The objective of the Office of Environmental Services Matching Grants Program is to assist local environmental agencies in obtaining the financial resources necessary to inventory and document environmental resources; to prepare policy recommendations to protect those resources; and to prepare and disseminate information to the public concerning the ways in which the public can participate in protecting the environment.

#### **ADMINISTRATION**

The Commissioner of the Department of Environmental Protection and Energy (DEPE) is responsible for the administration of this program. The Office of Environmental Services (OES) has been designated to assist the Commissioner in administering the program. Applications for financial assistance and requests for information should be directed to the address listed above.

This 1991/92 PROCEDURAL GUIDE contains detailed information about program requirements and application procedures. It has been prepared based upon rules published in the New Jersey Administrative Code (N.J.A.C.). For the official version of the rules consult N.J.A.C. 7:5-1.1 et. seq. or contact the OES.

**1. What types of agencies are eligible to apply for funding?**

Local environmental agencies are eligible to submit applications for OES Matching Grants. "Local environmental agency" means either a municipal environmental commission, joint environmental commission established by two or more municipalities, county environmental commission or soil conservation district.

Note: For a municipal or joint municipal environmental commission to be eligible to apply for funding, it must be an official environmental commission, established by one or more municipal ordinances prepared in accordance with the state law governing the formation of municipal environmental commissions (N.J.S.A. 40:56A-1 et seq.).

**2. What types of projects are eligible for funding?**

Any of the following:

- a. Natural and environmental resources inventories or portions thereof including, but not limited to, identification of stream corridors, wetlands, floodplains, forestry resources, steep slopes, important open spaces, scenic areas, wildlife habitat, cultural features and potential public recreation and conservation lands;
- b. New and updated planning studies and reports describing strategies to protect natural and environmental resources including, but not limited to plans for the creation, protection or preservation of greenways; open spaces; stream corridors; forestry or scenic resources; urban, suburban and rural trails or bikeways;
- c. Preparation of draft ordinances or master plan amendments to protect natural and environmental resources, for referral to a municipal or county governing body; and
- d. Projects designed to disseminate information to the public concerning environmental resources including, but not limited to, actions that individuals, public institutions and business entities can take to protect the environment.

**3. What types of items are eligible for funding?**

- a. The following items are eligible for funding by the Program, when incurred implementing qualifying projects listed in #2 above:
  - (1) Costs of materials, supplies and reproduction for reports, policy recommendations, draft ordinances, publications, maps, diagrams and other similar documents;
  - (2) Fees and direct expenses for consultants, including but not limited to those for architects, attorneys, cartographers, computer data base managers, engineers, environmental resource consultants, historic preservationists, landscape architects and planners; and

(3) Up to \$500.00 total for the purchase of capital-type goods, such as furniture, equipment or machinery which is determined by OES to be required for the execution of a project that is approved by OES.

b. The following list includes examples of items and costs that are not eligible for funding by the Program, nor will they be considered matching funding on the part of a local environmental agency:

(1) Charges for time spent by volunteers or paid municipal employees;

(2) Any sums spent in excess of a total of \$500 for the purchase of capital-type goods;

(3) Costs of acquisition of real property, although costs for planning studies on which eventual land acquisition may be based are eligible for funding;

(4) Real estate appraisals;

(5) Metes and bounds property surveys;

(6) Construction or real estate improvement activities of any kind;

(7) Costs of services, materials or equipment obtained under any other State program;

(8) Costs of fund raising; or

(9) Costs of lobbying;

#### 4. How much funding is available?

The exact amount of funding available is not known at this time, but it is estimated at between \$100,000 and \$200,000 total. Available funds will be allocated to the following categories:

a. Ninety percent to the Municipal category - This category includes municipal and joint municipal environmental commissions.

b. Ten percent to the Non-Municipal Category - This category includes county environmental commissions and soil conservation districts.

This formula is based upon the fact that there are over ten times as many municipal level agencies as there are county level agencies. If there are not sufficient qualifying applications within one category to make use of available funding, the amount of unutilized funds will be transferred for award to eligible applicants within the other category.

5. How will grant applications be evaluated?

Within each funding category described in #4 above, all applications for OES Matching Grants shall, for the purpose of determining priority for funding, be ranked on the basis of the degree to which the proposed project:

a. Public support

Has the broad support of other local or county agencies, civic groups, etc. (Letters of endorsement may be submitted to OES as evidence of such support);

b. Availability of Matching Funds

Has the demonstrated support of the local governing body in charge of allocating matching funding (Resolutions or letters of intent to provide matching funding shall be considered as evidence of such support.);

c. Regional Needs

Is responsive to regional as well as local needs (Projects undertaken jointly by adjacent local environmental agencies are encouraged.);

d. Urban Needs

Will address urban environmental needs (e.g. - planning which integrates such things as open space and recreation with historic resources protection and urban forest management);

e. Definitive Resource Protection Strategy

Is designed to produce a definitive strategy to protect a resource area, particularly projects which integrate regulation of environmentally sensitive areas with local, regional and statewide open space and recreation planning;

f. Relationship to State Development and Redevelopment Plan

Will document and protect environmental resources that are of particular importance in implementing the State Development and Redevelopment Plan;

g. Relationship to DEPE Responsibilities

Helps to incorporate planning and regulatory responsibilities of the DEPE into the local and regional planning processes:

h Public Awareness

Will raise awareness of the public's responsibility to actively participate in protecting the environment; and

i. Tangible Results

Demonstrates a strong likelihood of tangible results.

6. What is the amount of each grant?

A local environmental agency may apply for a grant ranging in any amount from a minimum of \$1,000 to a maximum of \$2,500, except that in the case of a joint environmental commission the maximum shall be \$2,500 per participating municipality. The local environmental agency must agree to match the amount of its grant request with an equal amount or more of funding dedicated to the project from other sources. The contribution by the Department shall not exceed 50 percent of the cost of the project which qualifies for a grant.

7. How will the grants be paid?

The entire grant amount will be paid to each grant recipient in one sum, upon receipt and acceptance by the OES of all work products described in the grant agreement between the grant recipient and the DEPE.

8. When should applications be submitted?

In fiscal year 1992 (July 91 - June 92) one round of grant applications will be considered. The deadline for filing applications is December 1, 1991.

9. What is the application process?

- a. Complete the Application Form and required attachments.
- b. Additional information, including previous work products of the local environmental agency, newspaper accounts and other background materials are welcome, but not required.
- c. Prepare and submit to the OES the original, plus one copy of the application and the supporting documentation. All submissions become the property of DEP and can not be returned.
- d. All items in the application must be completed and delivered to the OES or postmarked by the December 1, 1991 deadline. Incomplete applications or those received after the deadline will not be considered for funding.
- e. A notice of receipt of the application will be sent by the OES to each applicant.

(continued on the reverse side)

- f. On or about March 1, 1992 the OES will notify each applicant of its determination to approve, conditionally approve or deny the application.
- g. OES will then prepare draft grant agreements (contracts) for approval by grant recipients and the DEPE
- h. Final grant agreements will be fully approved by grant recipients and the DEPE on or about May 31, 1992, at which time projects can begin.

APPENDIX 12  
GUIDELINES ON CLUSTERING

# Guidelines On "Clustering," A Pattern Of Settlement

Extension Leaflet 580

**Donald M. Rippey**

**Extension Agent-  
Resource Management  
Ocean County  
Extension Service**

THE STATE UNIVERSITY OF NEW JERSEY  
**RUTGERS**

**T**he New Jersey Cooperative Extension Service (CES) is concerned with the conservation and wise use of our natural resources and with environmental quality within the state.

If current growth rates and development patterns in New Jersey continue, virtually all of our farmland, woodlands, and much of our other critical natural resource areas will eventually disappear under a "spread city" of urban and suburban sprawl.

This prospect reflects neither wise management of our natural resources nor the best interests of the people of New Jersey. Nor does the CES believe that this is what the people of this state really want.

Residents of New Jersey must, therefore, make some choices. They may choose to let things go on as at present, in which case they have no real voice in what will happen to them and to the state. Or they may choose to adopt some truly responsive, effective systems of comprehensive planning and land use controls that will insure that valuable and extensive natural resources and open spaces will be retained for the future benefit of all. In the latter case, they will truly be taking a hand in choosing and shaping their own destinies and the future physical condition of their state, county, and local community.

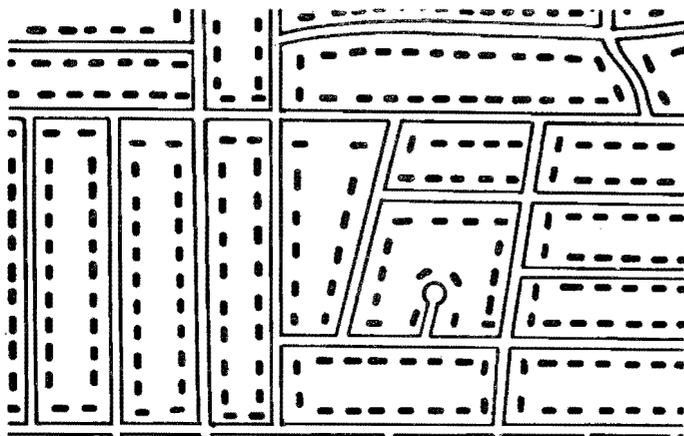
One of the useful tools often mentioned to achieve more rational planning and save resources and open spaces is the idea of "clustering." This is defined as grouping residential units closer together than the zoning calls for, by reducing lot size, in order to obtain common or public open space for various purposes. Cluster zoning establishes a maximum density for an area, usually in terms of dwelling units per acre. One portion of a tract of land within the area may be developed at high density or varying densities, with the remaining open space devoted to use by persons in the subdivision or by all residents of the community. In no case, however, does the average density exceed the maximum for the area.

In the course of their work, CES faculty members see numerous construction proposals. Many of them are called clustered residence areas or planned unit developments or planned residential developments.

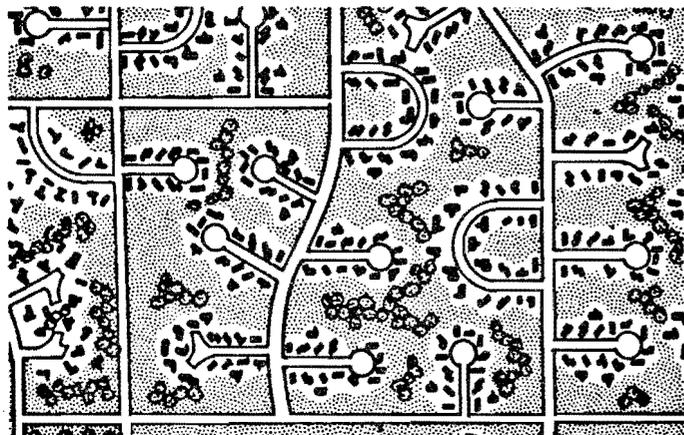
The increased emphasis on cluster developments has prompted CES to define more clearly, both for its own guidance and for the use of others, principles and guidelines for clustering.

1. Cluster developments should be placed within the framework of a community master planning process, which takes into account both the natural resources of the community and their capacity to withstand use or abuse (sensitivity to development).
2. Each cluster development should be part of an integrated system of common open spaces which follows an expressed rationale or purpose as stated in the community master plan.
3. The population housed in the cluster development should not exceed, and could be less than, that which would be housed under the zoning that it replaces. The purpose of clustering is to gain open space for that same number of people, not to increase population and thus the average densities of the area.
4. Open spaces thus saved should be contiguous as much as possible, effective, and useable. Piecemeal, scattered, unrelated open spaces, though better than sprawl, will

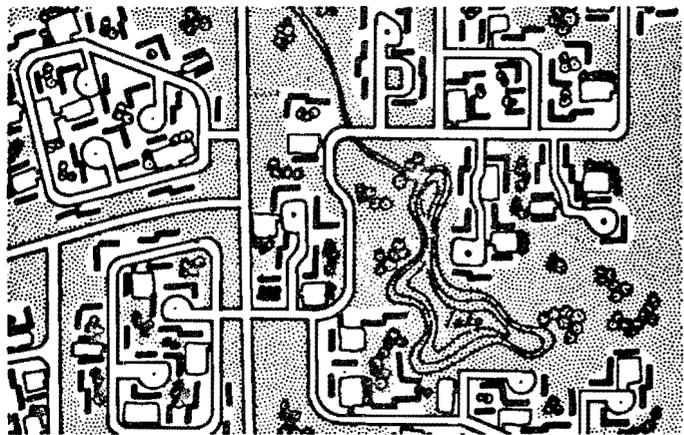
## Types of Development\*



A. Single family conventional, 100 acres.



B. Single family clustered, 100 acres.

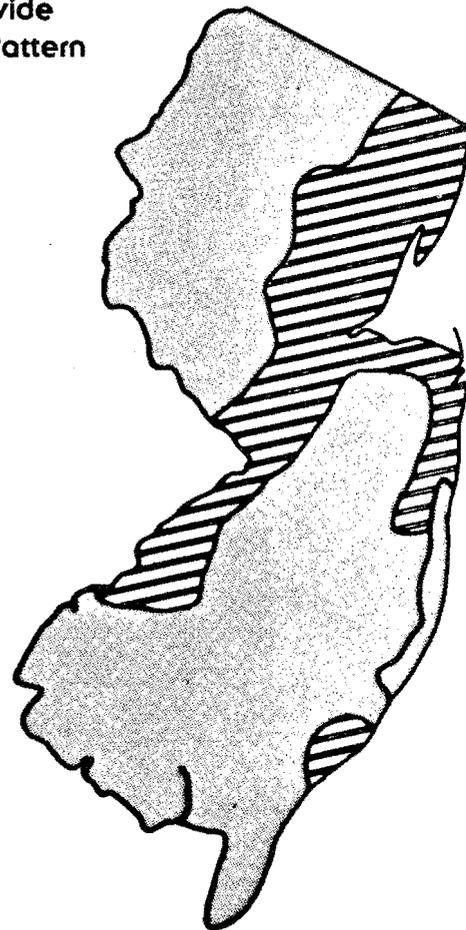


C. Townhouses clustered, 100 acres.

not achieve the full potential of clustering. The open space saved should be suitable, within the limitations of the soil and the environment, to use for the intended reserved purpose. A minimum percentage of open space for each development should be specified in the cluster ordinance.

5. Open spaces should be sought by clustering to:
  - (a) meet its fair share of the active and/or passive recreational, aesthetic, and psychological needs of the community as expressed in the community master plan;
  - (b) preserve parts of the environment that are unique, historical, or otherwise important; that are needed for water supply or replenishment; that are so-called "critical" areas such as floodable, highly erodable, or unstable places, or where soils present limitations for use;
  - (c) save agricultural land or other land basic to the "food chain," such as wetlands;
  - (d) save woodland and wildlife habitat;
  - (e) ensure general environmental quality, including clean air with adequate oxygen, noise control, and aesthetics.

### A Statewide Cluster Pattern



\*Taken from *The Costs of Sprawl* by the Real Estate Research Corp., April 1974.

6. In any cluster arrangement that saves common open space areas, the responsibility for preservation and maintenance of the open space should be clearly spelled out as to who, how, when, and where. Literature on effective and workable common land agreements is readily available.\*

7. Cost savings made possible by using the cluster idea should be passed on to the home buyer either in terms of reduced housing costs, or of increased space or quality, or both.

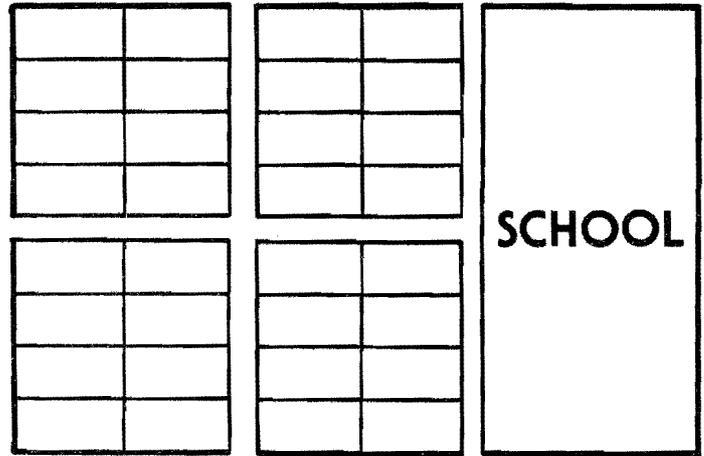
8. It is CES's belief that the larger cluster projects, and certainly the cumulative result of all housing in the community, should reflect the complete range of housing costs and types in a mix determined by the community planning process to be the community's "fair share" of the region's housing needs. Minimum quality standards and performance standards for structures should be included in the cluster ordinance. Desirable amenities, such as quality landscaping, maximum use of existing vegetation, noise control, and privacy, should also be insured.

9. If the transfer of development rights idea becomes available to municipalities in New Jersey, CES believes that it would make possible the application of the cluster principle to the entire community as a single, total cluster unit. This would be more desirable than smaller, individual units, particularly in cases where large expanses of important natural resource areas, such as wetlands, pinelands, or agricultural land need to be protected.

10. While abiding by current zoning as the population determinant of a community for now, CES believes that research and study should be undertaken by local, state, and federal governments to determine as nearly as possible the limits of population that the natural resources of individual communities, the county, the state, and the nation could support (carrying capacity), and to apportion a share of that population to each according to its ability to support interdependently with all the others. As an alternate, it is possible that the people of a state or local community can determine that a less-than-carrying capacity population is more desirable for it. In either case, all zoning ordinances should then be readjusted accordingly.

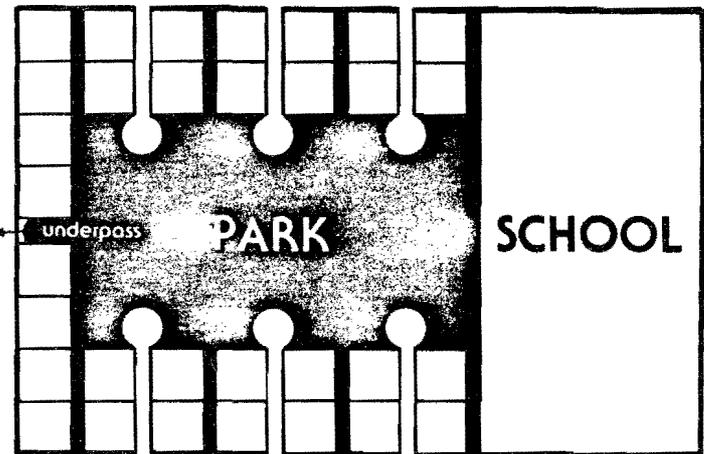
\*An example is: Wolfe, David B., **Condominium and Homeowner Associations That Work, On Paper and In Action**, published jointly by the Urban Land Institute and the Community Associations Institute, 1978, 136 pages. This work contains references to most, if not all, of the relevant material on this subject. The Urban Land Institute, 1200 18th Street, N.W., Washington, D.C. 20036.

## Traditional vs. Clustered Pattern of Settlement



### 1 1/2 Acre Lots

Drawing 1 shows a traditional pattern of settlement where the area is divided into lots and streets. Notice that to get to the school, children have to cross at least one street with automobile traffic on it, a condition that is always dangerous.



### 2 1/4 Acre Lots

Drawing 2 shows a better way of subdividing the land. The same number of lots exists, but each lot is reduced in size, creating more open space for park and recreation.

These guidelines were originally prepared for the Ocean County Soil Conservation District by the author. Many key persons in the county and state commented on, and thus contributed to, this document.



**RUTGERS COOPERATIVE EXTENSION  
N.J. AGRICULTURAL EXPERIMENT STATION  
RUTGERS, THE STATE UNIVERSITY OF NEW JERSEY  
NEW BRUNSWICK**

Distributed in cooperation with U.S. Department of Agriculture in furtherance of the Acts of Congress of May 8 and June 30, 1914. Cooperative Extension work in agriculture, home economics, and 4-H. John L. Gerwig, director of Extension. Rutgers Cooperative Extension provides information and educational services to all people without regard to sex, race, color, national origin, or handicap. Rutgers Cooperative Extension is an Equal Opportunity Employer.

APPENDIX 13

LANDSCAPING LIST OF NATIVE NEW JERSEY PLANTS

## PARTIAL LIST OF NATIVE VEGETATION FOR LANDSCAPING

1. Pitch pine
2. Short-leaf pine
3. Black oak
4. Southern red oak
5. White oak
6. Blackjack oak
7. *Scrub oak*
8. Post oak
9. Chestnut oak
10. Scarlet oak
11. Black huckleberry
12. Dangleberry
13. Sheep laurel
14. American holly
15. Low bush blueberry
16. Mountain laurel
17. Grasses, such as the little bluestem, deertongue, redtop, and switchgrass

SOURCE: Comprehensive Management Plan for the Pinelands National Reserve. New Jersey Pinelands Commission, 1980.

APPENDIX 14

EXAMPLES OF COUNTY OPEN SPACE REFERENDA

ATLANTIC COUNTY ORDINANCE NO. 16 1990

ORDINANCE REQUESTING THE PLACEMENT OF A REFERENDUM  
ON THE OFFICIAL BALLOT FOR THE GENERAL ELECTION  
ON NOVEMBER 6, 1990.

WHEREAS, P.L. 1989 Chapter 30 was enacted on February 17, 1989, and

WHEREAS, P.L. 1989 Chapter 30 provides for the establishment of an Open-Space Preservation Trust Fund in Counties whose voters approve a proposition authorizing the acquisition of lands for conservation as open-space in a sum not to exceed the amount or rate set forth in the proposition approved by the voters, and

WHEREAS, the County of Atlantic desires to put such a question before the voters pursuant to N.J.S.A. 19:37-1 in order to ascertain the sentiment of the legal voters of Atlantic County upon this question.

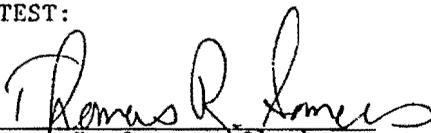
NOW, THEREFORE, BE IT RESOLVED by the Board of Chosen Freeholders of the County of Atlantic that:

1. The County hereby requests the Clerk of Atlantic County to print on the official ballot to be used in the November 6, 1990 General election the following public question:

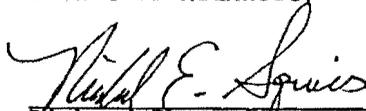
Should the County of Atlantic prepare and implement a park, recreational and open-space acquisition plan for the purpose of acquiring lands for conservation as open-space and annually fund such acquisitions pursuant to a "County Open-Space Preservation Trust Fund Tax" as permitted under P.L. 1989 Chapter 30 at a rate not to exceed 2 cents per \$100 of assessed valuation, said trust fund to be exclusively used for open-space preservation as identified in the proposed plan?

2. A certified copy of this ordinance shall be sent to the Clerk of Atlantic County.

ATTEST:

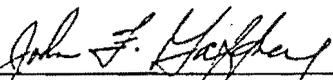
  
Thomas R. Somers, Clerk  
Board of Chosen Freeholders

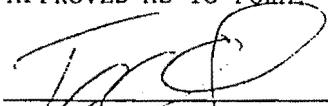
COUNTY OF ATLANTIC

  
Richard E. Squires  
County of Atlantic

Dated: 5-19-90

APPROVED AS TO FORM:

  
John F. Gaffney, Chairman  
Board of Chosen Freeholders

  
Terry J. Dailey  
County Counsel

5/15/90

BOARD OF CHOSEN FREEHOLDERS  
CAPE MAY COUNTY, NEW JERSEY

RESOLUTION

No. 705-89

RESOLUTION REQUESTING THE PLACEMENT OF A REFERENDUM ON THE OFFICIAL BALLOT FOR THE GENERAL ELECTION ON NOVEMBER 9, 1989.

WHEREAS, Legislation has been enacted allowing counties to establish an open space fund, and

WHEREAS, a prerequisite for establishing such a fund requires that the rate of funding which is to be apportioned to municipalities similar to the County Library tax, and the opinion of the voters in response to a ballot proposition be obtained prior to establishment of any such fund; and

WHEREAS, such a ballot question is not mandatory and the establishment of any such trust fund would be subject to Freeholder approval subsequent to any such ballot question.

WHEREAS, N.J.S.A. 19:37-1 provides a procedure whereby the governing body of any county may ascertain the sentiment of the voters on any question pertaining to the government thereof pursuant to a referendum question.

NOW, THEREFORE, BE IT RESOLVED by the Board of Chosen Freeholders of the County of Cape May that the County hereby requests the Clerk of Cape May County to print on the official ballot to be used in the General Election to be held on November 9, 1989 the following public question:

County Question #2

Should the County of Cape May consider establishment of an open space trust fund to preserve open space and agricultural lands such trust fund to be set at a rate of .01 cents per \$100 of assessed valuation, which would generate approximately \$1,000,000 per year for such a fund for open space and farmland preservation. Said trust fund to be exclusively used for open space and farmland preservation as identified in accordance with a park, recreational, open space, and farmland preservation plan to be prepared and adopted by the County.

BE IT FURTHER RESOLVED, that a certified copy of this Resolution be sent to the Clerk of Cape May County immediately upon passage.

cc: County Clerk  
County Counsel  
File: County Clerk

Offered by Michael D. Rudolph Seconded by Daniel Bayel

STATE OF NEW JERSEY } ss.:  
COUNTY OF CAPE MAY }

I, Diane E. Rudolph, Clerk of the Board of Chosen Freeholders of the County of Cape May, State of New Jersey, do hereby certify that the foregoing is a correct and true copy of a resolution adopted by the Board at a meeting duly held on the 22nd day of AUGUST 19 89

Signed, Diane E. Rudolph  
Clerk of the Board.

Roll Call	Ayes	Nayes	Abstain	Absent
Mr. Kilpatrick	✓			
Mr. Bayel	✓			
Mr. Fredrick	✓			
Mr. Sturm	✓			
Mr. Evans	✓			

RESOLUTION AUTHORIZING NON BINDING VOTER REFERENDUM  
TO RAISE \$4,000,000 ANNUALLY TO ACQUIRE LANDS.

Freeholder POWERS offers the following Resolution and moves its adoption:

WHEREAS, the County of Monmouth, through development, is fast losing its heritage of open space, which loss may impair the quality of life as enjoyed over the years in Monmouth County;

WHEREAS, the Board of Chosen Freeholders is considering a policy for validating an additional \$4,000,000 each year, in order to acquire lands for permanent dedication as parks and recreation areas for future generations of Monmouth County, and

WHEREAS, the Board desires to ascertain the sentiment of the residents of Monmouth County concerning the wisdom and appropriateness of this proposed expenditure;

NOW, THEREFORE, BE IT RESOLVED by the Board of Chosen Freeholders that it hereby requests that the County Clerk print upon the official ballot, of the next general election to be held on November 3, 1987, the following question:

"Should the County of Monmouth go forward with a policy to preserve open space by allocating \$4,000,000 each year for the purchase of park and recreation lands?"

The Clerk is further requested to print, on said ballot, the following explanatory statement of the question presented. The statement is:

"This non binding referendum will give the elected County officials the sentiment of the voters concerning a proposed policy commitment of the County to undertake a program of annual funding to acquire open space for park and recreation areas, thereby permanently preserving these areas for future generations of Monmouth County residents."

BE IT FURTHER RESOLVED that the Clerk forward a certified true copy of this Resolution to Jane Clayton, Clerk of Monmouth County, and to the Board of Recreation Commissioners.

Seconded by Freeholder D'AMICO and adopted on the following roll call:

In the Affirmative: Messrs. D'Amico, Narozanick, Powers, Villapiano and Director Larrison.

In the Negative: None

I HEREBY CERTIFY THIS TO BE A TRUE COPY OF A RESOLUTION ADOPTED BY THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF MONMOUTH

RESOLUTION NO. 87-124

AGENDA NO. \_\_\_\_\_

RESOLUTION AUTHORIZING NONBINDING VOTER REFERENDUM  
TO RAISE \$4 MILLION ANNUALLY TO ACQUIRE LANDS

Freeholder POWERS offered the following  
resolution and moved its adoption:

WHEREAS, Monmouth County is fast losing its heritage of  
open space, forests, and fields; and

WHEREAS, suburban sprawl has been bringing major  
problems to Monmouth County, including traffic congestion, and  
substantially increased demands on school systems, police  
services, sewer systems, and related costs; and

WHEREAS, the Board of Chosen Freeholders for the County  
of Monmouth deems it to be in the best interests of the County to  
raise an additional \$4 million annually to acquire lands for  
permanent dedication as parks and recreation for future  
generations of Monmouth County residents; and

WHEREAS, the Board of Freeholders feels that a  
nonbinding voter referendum concerning this expenditure is  
appropriate;

NOW, THEREFORE, BE IT RESOLVED by the Board of Chosen  
Freeholders of the County of Monmouth that a nonbinding voter  
referendum be placed on the November, 1987 ballot as to whether

County officials should raise an additional \$4 million annually to acquire lands for permanent dedication as parks and recreation for future generations.

BE IT FURTHER RESOLVED that the Clerk forward certified true copies of this resolution to the Board of Recreation Commissioners, and to County Clerk Jane Clayton.

Seconded by Freeholder D'AMICO and adopted on roll call by the following vote:

	YES	NO	ABSTAIN	ABSENT
MR. VILLAPIANO	( X )	( )	( )	( )
MR. D'AMICO	( X )	( )	( )	( )
MR. NAROZANICK	( X )	( )	( )	( )
MR. POWERS	( X )	( )	( )	( )
MR. LARRISON	( X )	( )	( )	( )

CERTIFICATE

I HEREBY CERTIFY THE ABOVE TO BE A TRUE COPY OF A RESOLUTION ADOPTED BY THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF SOUTHWORTH AT A MEETING HELD February 10, 1967

*Richard C. [Signature]*

R E S O L U T I O N

Freeholder NAROZANICK offered the following Resolution and moved its adoption:

WHEREAS, the Board of Chosen Freeholders of the County of Monmouth adopted a resolution on February 10, 1987, authorizing a non-binding referendum to raise \$4 million annually to acquire lands for permanent dedication as parks and recreation for future generations, and

WHEREAS, the General Election Ballot in November 1987 contained the question

"Should the County of Monmouth go forward with a policy to preserve open space by allocating \$4,000,000. each year for the purchase of park and recreation lands?"

with an Explanatory Statement

"This non-binding referendum will give the elected County officials the sentiment of the voters concerning a proposed policy commitment of the County to undertake a program of annual funding to acquire open space for park and recreation areas, thereby permanently preserving these areas for future generations of Monmouth County residents." and

WHEREAS, the voters of the County of Monmouth approved the non-binding referendum by the vote of YES 75,259 and NO 30,155, and

WHEREAS, at the request of the Board of Chosen Freeholders of the County of Monmouth, in order to implement the program for said land acquisition for park and recreation areas, the Board of Chosen Freeholders *enlisted the aid of the New Jersey Legislative representatives of the 12th Legislative District* for the preparation of appropriate legislation in order to implement the program and,

WHEREAS, Assembly Bill 2297 was introduced by Assemblyman John O. Bennett and approved by the appropriate legislative committees and,

WHEREAS, on February 17, 1989 said legislation being Assembly Bill 2297 "An Act Concerning Open Space Preservation By Certain Counties and Supplementing Title 40 of the Revised Statutes" was signed by the Governor, Thomas H. Kean, and

WHEREAS, said legislation provides that amounts raised by taxation for the acquisition of open space shall be apportioned by the County Board of Taxation among the municipalities within the Counties in accordance with R.S. 54:4-49. The amounts so apportioned shall be assessed, levied and collected in the same manner and at the same time as other County taxes. The tax collection hereunder shall be referred to as the "County Open Space Preservation Trust Fund Tax", and

WHEREAS, the Board of Chosen Freeholders of the County of Monmouth desires to implement this program of annually appropriating funds to be raised by taxation for the purpose set forth in the above mentioned legislation and,

WHEREAS, the Board of Chosen Freeholders recognizing that the question contained on the ballot was a non-binding referendum, and

WHEREAS, the Board of Chosen Freeholders believes and is of the judgement that prior to the implementation of this program for the establishment of the County Open Space Preservation Trust Fund Tax that the residents of the County of Monmouth have an opportunity to express their opinion and comments.

NOW, THEREFORE, BE IT RESOLVED, by the Board of Chosen Freeholders that a Public Hearing be held at which time interested citizens could appear and voice their comments with respect to the implementation of the program.

BE IT FURTHER RESOLVED that an appropriate notice of the Public Hearing be given and that said Public Hearing be held on March 27, 1989

at the hour of 8:00 p.m. in the Grand Jury Assembly Room, Monmouth County Court House, Court Street, Freehold, N.J.

Seconded by Freeholder POWERS and adopted upon the following vote:

	YES	NO	ABSTAIN	ABSENT
Mr. Fallon	X			
Mr. Bedell	X			
Mr. Narozanick	X			
Mr. Powers	X			
Mr. Larrison	X			

CERTIFICATION  
I HEREBY CERTIFY THE ABOVE TO BE A TRUE COPY  
OF A RESOLUTION ADOPTED BY THE BOARD OF CHOSEN  
FREEHOLDERS OF THE COUNTY OF MONMOUTH AT A  
MEETING HELD MARCH 9 1989  
Richard C. Powers  
CLERK

RECEIVED BY FREEHOLDER  
THEODORE J. NAROZANICK

Resolution No. 89-280

APR 19 1989

A.M. P.M.  
7 8 9 10 11 12 1 2 3 4 5 6

RESOLUTION AUTHORIZING MONMOUTH COUNTY OPEN SPACE  
PRESERVATION TRUST FUND TAX

Freeholder **NAROZANICK** offered the following resolution  
and moved its adoption:

WHEREAS, a referendum was overwhelmingly approved by the  
voters in November of 1987 whereby the Board of Freeholders would appropriate  
annually the sum of \$4,000,000.00 for the acquisition of open spaces  
and establishment of a Land Trust Fund; and

WHEREAS, Governor Thomas Kean signed into law Assembly Bill  
2297 on February 17, 1989, pursuant to the above referendum providing  
that amounts raised by taxation for the acquisition for open space  
pursuant to the act shall be apportioned by the County Board of Taxation  
among the municipalities within the County in accordance with R.S.54:4-49;  
and

WHEREAS, the amount so apportioned shall be assessed, levied  
and collected as in the same manner and at the same time as the County  
taxes; and

WHEREAS, a Public Hearing was conducted by the Board of Chosen  
Freeholders on March 27, 1989 at which numerous parties testified,  
all of them in favor of the Open Space Preservation Trust Fund Tax.

NOW, THEREFORE, BE IT RESOLVED by the Board of Chosen Freeholders  
of the County of Monmouth that the sum of \$4,000,000.00 in tax revenues,  
pursuant to the above referenced referendum and legislation, be collected

annually and referred to as the "County Open Space Preservation Trust Fund Tax"

BE IT FURTHER RESOLVED that the Clerk forward a certified true copy of this resolution to the Monmouth County Tax Board, the Board of Recreation Commissioners and the Mayors and Governing Bodies of each municipality in Monmouth County.

Seconded by Freeholder POWERS and adopted on roll call by the following vote:

	YES	NO	ABSTAIN	ABSENT
Mr. Fallon	( X )	( )	( )	( )
Mr. Bedell	( X )	( )	( )	( )
Mr. Narozanick	( X )	( )	( )	( )
Mr. Powers	( X )	( )	( )	( )
Mr. Larrison	( X )	( )	( )	( )

CERTIFICATION

I HEREBY CERTIFY THE ABOVE TO BE A TRUE COPY OF A RESOLUTION ADOPTED BY THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF MONMOUTH AT A MEETING HELD April 13 1889

*Richard C. [Signature]*  
CLERK

APPENDIX 15

MODEL ORDINANCE FOR TREE PROTECTION

# NEW JERSEY FORESTRY SERVICES

## A Model Ordinance For Municipalities

### Concerning the Removal, Protection, and Planting of Trees During and After Construction

#### SECTION 1. Purpose

The governing body does herein find trees to be an important cultural, ecological, scenic, and economic resource which add immeasurably to the residents quality of life and well-being. The purpose of this ordinance is to protect trees from excessive removal, cutting, damage, destruction, and/or mortality during and after construction.

#### SECTION 2. Definitions

#### SECTION 3. Exceptions

Under this section, the following trees may be removed without filing a plan:

A. Any tree located on a parcel of land one acre in size on which a residence has been constructed.

B. Any tree removed in compliance with the Farmland Assessment Law.

C. Trees directed to be removed by municipal, county or state authority pursuant to law.

D. Any dead or diseased tree or any tree that endangers life or property, as determined by the enforcing officer.

E. Any tree which is part of a nursery, garden center, Christmas tree plantation, orchard, or cemetery.

F. Any tree to be cut for personal use by the owner.

#### SECTION 4. Compliance

No person shall cut, remove, damage or plant any tree during construction on land one acre or more in size where the Standard Building Code of the State of New Jersey requires a building permit without first obtaining approval of a Tree Protection and Planting Plan from \_\_\_\_\_ according to the provisions of this ordinance.

#### SECTION 5. Situations Requiring Tree Removal and Planting Plans

Tree removal and planting plans are required as stated in Section 4 above and in the following situations:

A. When application for approval of a subdivision, re-subdivision, site plan, planned development, conditional use or zoning variance is sought.

B. Where preliminary approval of a subdivision, re-subdivision, site plan or planned development has been granted.

C. Where final approval of a subdivision, re-subdivision, or planned development has been granted, but where work has not commenced the plan shall be filed within 60 days of the passage of this ordinance.

#### SECTION 6. Data Required For Tree Removal, Protection, and Planting Plans

Plans submitted for approval shall consist of text and maps with the following information:

A. Owner's name and address.

B. Tax Map, lot and block number.

C. Area of tract.

D. Location of trees or wooded area.

E. Species involved.

F. General slope and topography, taken from a recognized map of such features.

G. Location of streams and wetlands.

H. Map with a scale no larger than one inch equaling \_\_\_\_\_ feet.

I. Location of individual trees, groups of trees, woodland or other vegetation to be protected; keyed to text stating what measures will be taken and/or methods employed for protection and

J. A list of trees to be planted, selected from the preferred species list and/or rationale for substituted species.

K. Tree removal and planting plan in relation to principal and accessory buildings and septic systems, roads and

driveways, parking lots, garden areas and other development features.

L. Location of buildings, roads, driveways, parking lots, staging areas, recreation areas and garden areas.

M. Grading plan keyed to a discussion on the effects.

N. Maps, as applicable, showing location of trees and/or wooded areas to be removed, location of proposed loading deck, area to be cut and stream crossings and/or location, species and size of trees that will be planted after construction is completed.

#### SECTION 7. Criteria for Plan Approval and Compliance

A. Trees on a proposed building site may be removed from around a building foundation a reasonable and safe distance. (Safe distance equal to heights of perimeter trees)

B. Trees may be removed where the proposed paved portion of a parking area is planned. In off-street parking areas, other than for a single residential dwelling, islands of trees must be left. Paving of any impervious nature shall be avoided within the drip line of the tree and the grade shall be such that drainage of rainwater will keep the root area watered without pooling or exceeding the requirements of the species. Excess water shall be admitted to dry wells or storm sewers on the parking lot or drained by acceptable means.

C. Trees may be removed in private rights-of-ways and driveways within a reasonable and safe distance, each side of the planned paved area. Alignment of the driveways should be planned to save as many trees as possible.

D. If no area other than a wooded area or area with trees can be found to accommodate the building foundation, sewerage system, disposal field or well, meeting the approval of the appropriate inspector, necessary tree removal shall be permitted.

E. Where more than three (3) inches of fill is required around trees, the trees must be protected by an air well as needed around the trunk to prevent the intrusion of soil. The air well shall be constructed according to the latest technical information available. If the tree is a species that will eventually die due to root disturbance or change in drainage or the owner prefers to remove the tree, it may be removed and replaced with another tree from the preferred trees in another of the same area after the fill has stabilized.

F. Any activities, including clearing, construction, and grading must protect trees to be saved from machine operation, soil storage or material storage by a distance

equal to or greater than the drip line of the tree. Any tree damaged must be replaced.

G. Any tree used in a required planting must be at least two and one-half (2 1/2) inches in diameter and guaranteed for one year.

H. A buffer zone of trees and shrubs shall be established on the perimeter of the proposed building site.

I. Cluster development, commercial development, and industrial development shall consider the use of treeless areas, if possible, for building sites. If it is necessary to develop wooded areas or remove trees for proposed building sites in the case of such developments, the Municipality of \_\_\_\_\_ may require tree planting in treeless areas, if feasible.

J. Trees in the area between the street line and the setback line of the buildings shall be preserved to the greatest extent possible.

K. Tree removal from any slope or environmentally sensitive area is prohibited if it will contribute, in the opinion of the enforcing officer to extra runoff of surface water onto adjoining property and erosion and silting, unless other means approved by the \_\_\_\_\_ County Soil Conservation District are provided to prevent runoff and erosion.

L. No tree removal is permitted that will expose vacant land, back of existing billboards, transmission towers, warehouses, junkyards, landfill operations and other similar structures or operations except where trees are dead or diseased and/or endanger life or property. However, land may be exposed if it is necessary to remove trees for building sites or sewerage sites and more aesthetic values are established or if a more suitable buffer is planted or established.

M. No healthy tree that is special by virtue of history, unusual size or age or of a rare species shall be removed except as may be required for the protection of health, safety, or public welfare.

N. Trees and stumps may be removed to clear for soil removal or backfill, provided that the same amount of wooded area or the same number of trees are replaced according to an Approved Plan. If the finished operation is planned to be used for other development, the replacement of trees shall be a part of the subdivision plan or a site plan submitted for approval by the Planning Board.

O. Unless proven necessary, staging areas shall not be

closer than one hundred fifty (150) feet to any public road center. "Necessary" means that no other area is available due to topography, soil conditions or having unfavorable effects on the woodlot. Loading of trucks is permitted at the roadside and a loading area must be constructed off the roadway where possible. Roads must be protected from soil tracking. After the cutting operation is complete, any road modifications and changes in the right-of-way may be restored.

#### Section 8. Enforcement

The \_\_\_\_\_ official shall be the enforcing officer for all Approved Plans and shall:

- A. On his own initiative or on complaint of any individual take action to assure compliance with this ordinance.
- B. Have the authority to provide or request expert advice or assistance.
- C. Issue a stop work order if noncompliance with the approved tree protection and planting plan is evident or there is nonadherence to the requirements in Section 5. The stop work order will remain in effect until the municipality has determined that resuming work will not violate the conditions of the approved tree protection and planting plan.

#### Section 9. Permits and Fees

- A. A fee schedule will be determined to adequately cover the administrative costs of this ordinance. The fee shall be included with the permit application.
- B. The owner or applicant shall reimburse the Township for all cost of expert advice and technical assistance obtained in connection with this application for an Approved Plan which may exceed the fee schedule.

#### Section 10. Appeals

Any person aggrieved by the decision of any officer, board or body may, pursuant to the provisions of this ordinance, appeal the decision within ten (10) days to the Municipality of \_\_\_\_\_.

#### Section 11. Violations

- A. Any person violating any provision of this ordinance shall be subject to a fine not exceeding one-thousand dollars (\$1,000), or imprisonment for thirty (30) days, or both, in the discretion of the judge of the Municipal Court of the Municipality of \_\_\_\_\_.
- B. No certificate of Occupancy shall be issued unless tree removal, pruning, protection, and planting has been in accordance with the Approved Plan and all trees required to

be planted have been planted in accordance with the Approved Plan or a bond guaranteeing planting has been posted.

#### SECTION 2. DEFINITIONS

As used in this chapter, the following terms shall have the meanings indicated:

**AGRICULTURAL USE** - Land which is devoted to the production for sale of plants and animals, or when devoted to a soil conservation program under an agreement with an agency of the federal or state government.

**APPROVED PLAN** - A tree removal and planting plan which has been approved by the Town of \_\_\_\_\_.

**COMMUNITY BUILDINGS** - Schools, churches, clubs, lodges or any such building used by any organized group or by the public generally.

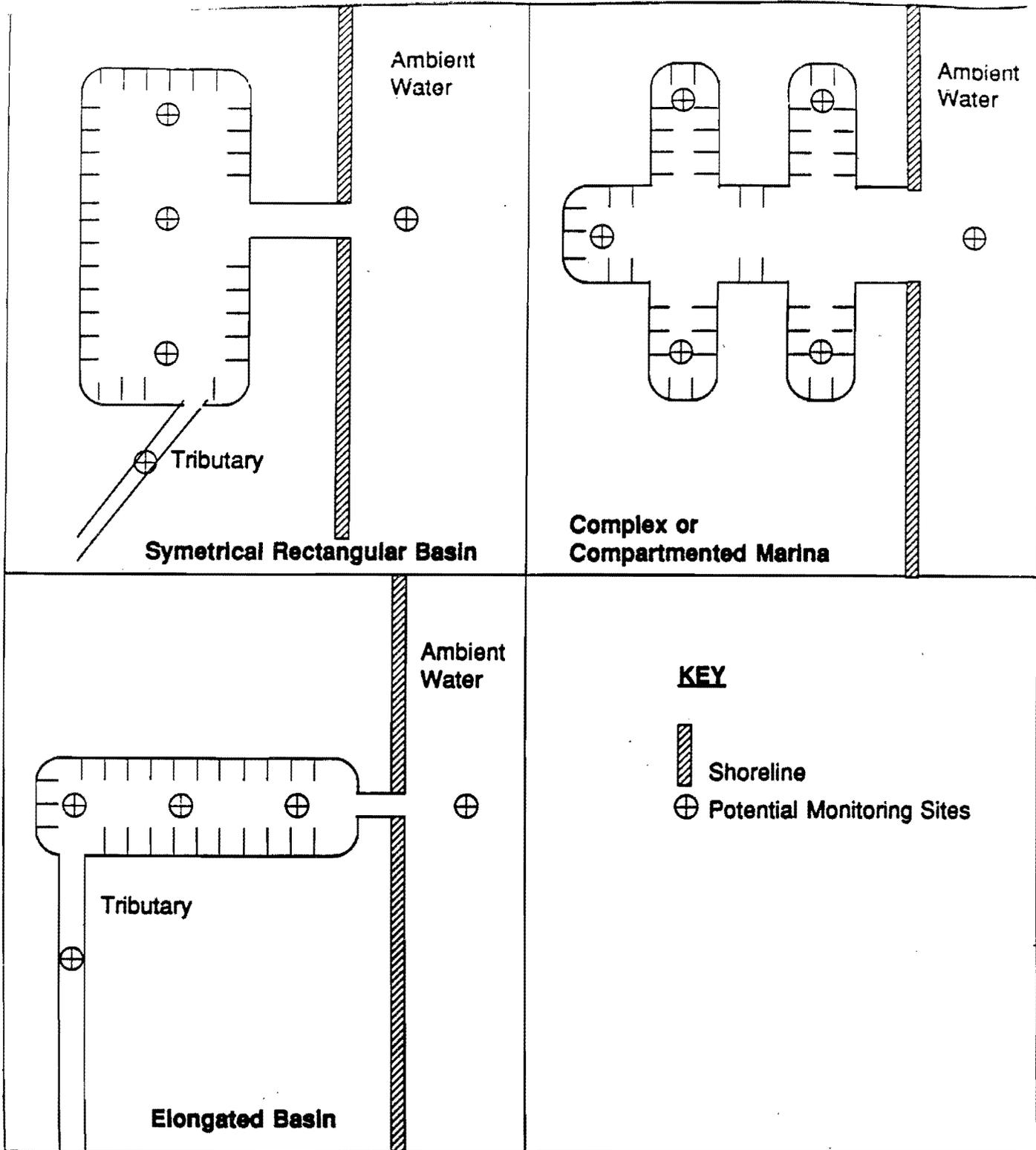
**DRIP LINE** - An imaginary line from the tips of the outermost branches of a tree projected vertically to the ground.

**FOREST MANAGEMENT PLAN** - A plan of tree removal and/or planting prepared by the NJ Bureau of Forest Management, an Approved Forester by the NJ Bureau of Forest Management, a landscape architect or a Certified Tree Expert.

**PREFERRED TREES** - Trees preferred by the NJ Bureau of Forest Management as best adapted to the climate, soil and topography of the Township of \_\_\_\_\_. A list of such trees shall be kept on file for the use and guidance of persons presenting plans for tree planting.

**RELEVANT LAND** - Any contiguous real property, owned by the same owners, one (1) acre or more in size where building, construction and subdivision is proposed.

**TREE** - Any woody perennial having a diameter greater than four (4) inches, measured at a point four and one-half (4 1/2) feet above the ground, (diameter breast height).



**Figure 5-3 -Illustration of Enclosed Marinas and Potential Monitoring Sites**

are indicated at the screening level, more detailed procedures may be applied to examine dissolved oxygen concentrations (see Figure 5-4).

The presence of salinity, dissolved oxygen or temperature gradients that result in stratification (as discussed in the open marina monitoring section) will require detailed procedures. The screening procedures for dissolved oxygen concentrations for proposed marinas located in semi-enclosed embayments should be based on a combination of dissolved oxygen monitoring coupled with the application of a steady state, tidally averaged water quality model and a flushing model. The monitoring guidance provided in the Open Marina section, above, should serve as the basis for the screening procedure. In addition, the average tide range and high and low water depths of the adjacent ambient waters, as well as the proposed marina, should be required to implement the screening models. Flow rates (seven day, ten year low), BOD, and dissolved oxygen concentrations of tributaries that will enter the proposed basin should also be provided or monitored. Additional monitoring may be necessary in areas where there is significant algal productivity, or in cases where detailed models are applied. Typical sampling sites for enclosed marinas are illustrated in Figure 5-3.

The screening level assessment of the minimum dissolved oxygen concentration should be based on the average dissolved oxygen concentration for the proposed basin as calculated above, and on the deviation between the average and minimum dissolved oxygen concentration measured in the ambient waters.

#### v. Tier 2 assessments: detailed procedures

Detailed procedures for dissolved oxygen analyses are recommended for proposed marinas that are not expected to be completely mixed due to stratification within the water column or due to the configuration of the marina basin. For example, proposed marina basins that are significantly elongated or segmented will prevent thorough mixing and will require detailed modeling. Detailed procedures may also be necessary to evaluate potential problems indicated by the screening level analysis. The detailed procedures used will be dependent on the specific site and model being considered.

As with the screening-level analysis, the detailed analysis should include a combination of monitoring and modeling. The model selected for the detailed analysis should have demonstrated applications in predicting average and minimum dissolved oxygen concentrations for systems that are similar to the marina basin configuration being proposed. The most available and accepted model with these abilities is the WASP model, which was developed and is supported by EPA. In most situations it will be the model of choice. The monitoring required to support a detailed model will vary with the model and the specific site. Sufficient data should be collected to calibrate the hydrodynamic and water quality components of each model for the specific site.

At preapplication meeting determine whether screening level model is appropriate, or provide guidance to applicant regarding what information must be collected to make this determination.

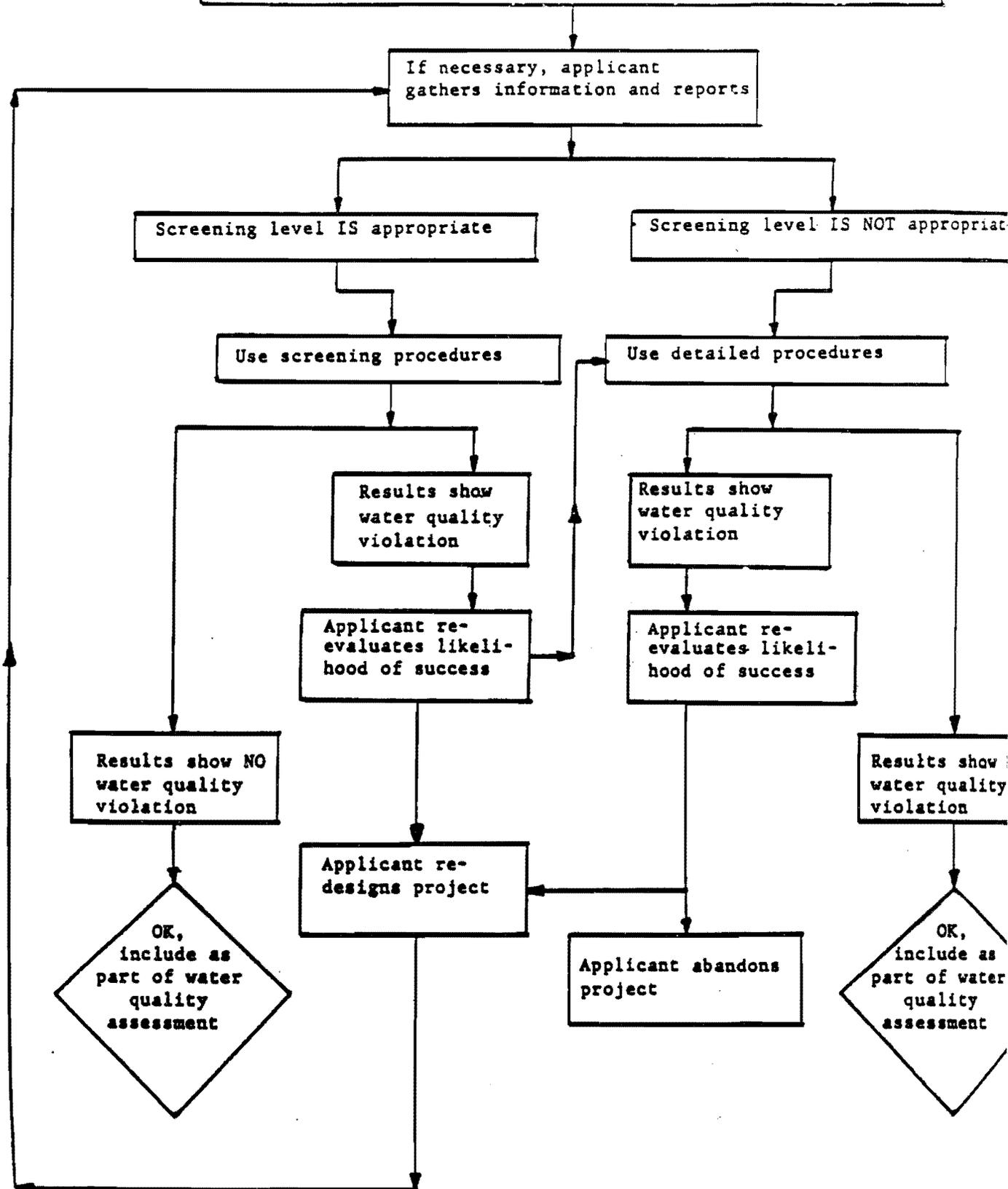


Figure 5-4, Flow Chart for Water Quality Assessments Requiring Modeling Analysis

#### d. Other parameters

Other parameters need only be investigated if there is a concern about the potential for violation of water quality standards.

### 2. Wetlands

The despoliation and destruction of public and private wetlands during marina construction and operation should be avoided. Further discussion on wetlands can be found in another chapter of this guidance.

### 3. Submerged Aquatic Vegetation

The net loss of submerged aquatic vegetation (SAV) should not be allowed. In no case should highly productive SAV be adversely impacted. If a marina is sited in the proximity of SAV, any related disturbance of these SAV areas should require compensation measures. Before such measures are approved it should be determined that substantial, prudent, and reasonable measures have been taken to avoid the impacts. Since this kind of vegetation cannot survive when heavily shaded, shading of SAV by piers crossing over them should be avoided.

### 4. Benthic Resources

The benthic community at the marina site should be evaluated using rapid bioassessment techniques (EPA, 1989; Luckenbach, Diaz and Schaffner, 1989). Benthic areas that are found to have degraded benthic communities should be considered for marina siting over those areas that are found to be healthy and productive. It is recommended that each state should develop rapid bioassessment techniques and criteria appropriate to their bioregions.

### 5. Critical Habitats

Marinas should not be sited in proximity to such areas if the project would adversely affect natural populations. A buffer zone should be established around critical habitats located near the project. The size of this zone should be decided on a case-and species-basis. No general or specific guidance regarding the extent of these buffer zones can be given because of the wide variation in requirements between species.

### 6. Dredging and Dredged Material Disposal

Ideally, marinas should be located where dredging will not be necessary to allow safe navigation. In many locations, unfortunately, this is not possible. Therefore, marinas should be sited at locations that require the least amount of dredging for the draft of the boats that will use that marina. In some cases, the draft may have to be limited to avoid or to minimize the amount of dredging. The area to be dredged should be the minimum needed for the marina itself, including the docking areas, fairways, and canals, and for other maneuvering areas that are needed. In

no case should the bottom of the marina be deeper than the adjacent open water. Marinas should not be built in sites that will require maintenance dredging more frequently than once every four years.

Previous sections of this guidebook have described natural resources which may be impacted by the construction and operation of a marina. Dredging to construct or maintain a marina can result in losses of these resources and/or adverse impacts to nearby resources because of the turbidity associated with dredging. In addition, because certain times of the year are more critical than others due to migration, spawning and early development of important species, dredging should not occur at all at such times.

During dredging operations, any project-related turbidity should be contained, thus minimizing adverse impacts to the surrounding habitat and avoiding possible violations of water quality standards. Proper placement of silt screens or turbidity curtains is a common and relatively effective method of containment. Marinas should not be built in sites that will require maintenance dredging more frequently than once every four years.

Whenever dredged material may be contaminated, disposal in an upland diked containment area is the preferred disposal method. Wherever feasible, applicants should use existing diked disposal areas. Diked disposal areas must be sized and designed to prevent resuspension or erosion of the dredged material and subsequent transport back into adjacent waters. They must also be sited to avoid ground water contamination.

Another disposal option, available only for clean, uncontaminated fill, is placement on or near shore, where it is desirable to enhance beach profiles, stabilize shorelines, and/or build or enhance wetlands.

Dredging in waters of the United States is regulated by the Army Corp of Engineers, as discussed earlier in the introduction. This guidance on dredging and dredge disposal is provided so that prospective marina owners have an indication as to what they may expect from efforts to site a marina.

## **7. Water Supply**

Marinas should be sited and designed to preclude any contamination of surface water or groundwater that is used for water supply. Runoff from potential areas of contamination, such as maintenance areas should be treated, as described under the Stormwater Management Section of this section.

Upland basins should not be excavated in areas upgradient or within 1000 feet of public or private well fields, nor should excavation occur within water supply protection areas, or where an increased threat of saline water encroachment is likely. A danger exists that dredging may improve the hydrologic "connection" between brackish water and the fresh water aquifer, which, when coupled with a head loss from pumpage within the aquifer, may result in contamination

of the aquifer. A buffer of less than 1000 feet may be used if it can be demonstrated that a lesser distance will result in no adverse impact on groundwater.

It should be demonstrated that there is an adequate water supply to serve all of their project needs. As a rule of thumb, 30 gallons/slip/day will be needed during peak usage periods.

#### **D. Pollutant Reductions and Costs**

Proper siting of marinas can completely avoid some of the NPS pollution impacts associated this type of development. Direct impacts to shellfish areas, wetlands, SAVs, and other benthic resources and habitats can be averted. Water quality problems can be greatly reduced or eliminated entirely through proper siting. The costs of identifying a good site for a marina and preparing a water quality assessment will be dependent upon regional and local conditions. Past efforts have varied from \$2,000 to \$16,000.

### **III. MANAGEMENT MEASURES FOR THE DESIGN OF MARINAS**

#### **A. Environmental Concerns**

The management measures, listed in Section B below, are designed to address the following water quality concerns.

Design considerations for the minimization of NPS pollution associated with marinas should include: shoreline stabilization, location of navigation channels, stormwater, dryboat storage, boat maintenance areas, fueling areas, and control of spills. Improper shoreline design can result in erosion or degradation of habitat. Placement and design of navigation channels is a major factor in flushing and resulting water quality. Boat maintenance activities that can result in NPS pollution include:

- Painting and paint removal,
- Welding, brazing, soldering, and metal cutting,
- Woodworking,
- Engine repair and service,
- Servicing LPG and CNG systems, and
- Boat washing and hull cleaning.

Rainfall runoff from areas where these activities occur becomes polluted with oils, greases, organic and inorganic wastes, and other potentially harmful substances. Introduction of these substances into adjacent waters can have significant adverse water quality impacts.

Marina fueling systems typically consist of storage tanks (usually underground) and pumps on shore, with fuel meters and dispensers mounted on a fuel pier or dock. Areas where boats are fueled are subject to contamination from petroleum hydrocarbons from leaks and spills.

## **B. Management Measures**

This section contains the management measures to be applied in the design of marinas:

- (1) Use natural vegetation to stabilize shorelines wherever possible.
- (2) Navigation and access channels should be located in areas with safe and convenient access to waters of navigable depth, based on the kind of vessel expected to use the marina, but in no case exceeding the depth of adjoining channels and waters.
- (3) The first one-half inch of runoff from the entire marina property for a 10-year 24-hour storm should be detained and released over a 24-hour period.
- (4) All stormwater management systems should be provided with a bypass or overflow system so that the peak discharge from a 10-year 24-hour storm will be safely conveyed to an erosion and scour-protected storm water outfall.
- (5) Dry boat storage should be utilized over wet slips wherever feasible.
- (6) Boat maintenance areas should be designed so that all maintenance activities that are significant potential sources of pollution can be accomplished over dry land and under roofs (where practical), allowing for proper control of by-products, debris, residues, solvents, spills, and stormwater runoff. All drains from maintenance areas should lead to a sump, holding tank, or pumpout facility from which the wastes can later be extracted for treatment and/or disposal. Drainage of maintenance areas directly into surface or ground water or wetlands should not be allowed.
- (7) Fueling stations generally should be located such that they are accessible by boat without entering or passing through the main berthing areas in order to avoid collisions.
- (8) Marina operators should have a spill contingency plan and the proper equipment and training to implement the plan.

## **C. Marina Design Practices**

This section provides technical guidance on practices that may be used as tools to assist in the implementation of the management measures set forth in Section IV.B. above.

## **1. Shoreline Protection and Basin Design**

Natural vegetation should be used wherever feasible to stabilize shorelines. However, when additional stabilization becomes necessary, sloping riprap revetments are preferred over vertical bulkheads, since they generally provide greater habitat and reduce wave reflections. Shoreline intertidal areas should be preserved to the greatest extent possible.

In instances where bulkheads are to be installed, they should be constructed in such a manner that they are effective against erosion and provide adequate bank stabilization. The potential for erosion and scour at the mudline should be evaluated. Bulkheads should be constructed to prevent losses of fine material through joints or cracks from the land side to the water side, which could ultimately lead to failure of the wall. Bulkheads should be stabilized by providing adequate anchorage (such as batter piles or tie backs) or adequate embedment, depending on the type of bulkhead. Where public walkways, steps, or ramps run adjacent to bulkheads, handrails or other safety provisions should be provided along the top of the wall where the vertical drop to the current mean low water line or mud line exceeds three feet, unless local or State building codes stipulate otherwise. Any interference with public access should be avoided.

Basins that are constructed with square corners or other stagnant water areas will tend to trap sediment and debris. If this debris is allowed to collect and settle to the bottom, an oxygen demand will be imposed on the water and water quality will suffer. Therefore, square corners should be avoided in critical down-wind or similar areas where this is most likely to be a problem. If square corners are unavoidable because of other considerations, then points of access should be provided in those corners to allow for easy clean out of accumulated debris.

Riprap revetments are considered to be flexible since they can accommodate minor consolidation and settlement of their foundations. Still, adequate provisions should be made to prevent migration and loss of fine materials through the riprap, such as placement of a filter fabric beneath the armor layer. The slope of the revetment should be sufficiently flat to maintain stability, but in no case should the slope be steeper than one vertical to 1.5 horizontal. In addition, adequate toe protection should be provided to compensate for known or anticipated scour.

Considerations for new construction are addressed in the urban section of this document. Control measures such as turbidity curtains, vegetative barriers, etc. should be used to contain erosion.

## **2. Navigation and Access Channels**

Channels should be located in areas with safe and convenient access to waters of navigable depth, based on the kind of vessels expected to use the marina, but in no case exceeding the depths of adjoining channels and waters. "Safe and convenient" access should be determined on a case-by-case basis, taking into account such factors as existing water depths, distance to existing canals and their depths, and tidal and wave actions. Before considering dredging,

should attempt to gain access to deeper water by extending docks and piers farther from shore. The maximum extent to which a pier should extend into the waterway should be determined by each state and applied in a consistent manner (10% of the width of the channel has been set in some cases). In some cases, rather than dredging (and possibly having to develop a compensation plan), it may make more sense to simply limit the maximum boat drafts in the marina or utilize dingy access to moorings. Where channels are narrow, dry stacking of boats should be considered.

Where dredging is unavoidable, natural or existing channels should be used to minimize the amount of dredging. Also, naturally existing channels are less likely than surrounding shallow areas to contain shellfish beds, submerged aquatic vegetation, or other resources which may complicate permitting and require mitigation or compensation measures.

### 3. Wastewater Facilities

Three types of onshore collection systems are available: marina-wide systems, portable/mobile systems, and dedicated slipside systems. Marina-wide collection systems include one or more centrally located sewage pumpout stations. These stations are generally located at the end of a pier, often on a fueling pier so that fueling and pumpout operations can be combined. Boats requiring pumpout services dock at the pump-out station, a flexible hose is connected to the wastewater fitting in the hull of the boat, and pumps or a vacuum system move the wastewater to an on-shore holding tank, a public sewer system, a private treatment facility, or other approved disposal facility. In cases where the boats in the marina use only small portable (removable) toilets, a satisfactory disposal facility could be a toilet into which the portable (removable) toilets can be dumped. Portable/mobile systems are similar to marina-wide systems except that the pumpout stations are mobile. The mobile unit includes a pump and a small storage tank. The unit is connected to the deck fitting on the vessel, and wastewater is pumped from the vessel's holding tank to the pumping unit's storage tank. When the storage tank is full, its contents are discharged into one of the previously listed approved disposal facilities. Dedicated slipside systems provide continuous wastewater collection at a slip. Slipside pumpout should be provided to live-aboard vessels. The remainder of the marina can still be served by either marina-wide or mobile pumpout systems.

Note that chemicals from holding tanks may retard the normal functioning of septic systems. Neither the chemicals nor the concentration of wastes has proven to be a significant problem for properly operating public treatment plants provided there is adequate dilution between the marina and the treatment plant. In some cases, the effluent from the marina may have to be diluted before introducing it to the sewer system.

Shoreside restroom facilities for the use of marina patrons should be required at all marinas. Adequate restroom facilities for any given marina are dependent upon the nature (recreational or public, or residential or planned community) and size of the marina and its ancillary features. Restroom facilities should be conveniently located and well-maintained to encourage their use by boaters at the marina. At residential or planned community marinas public restrooms may

not be required unless there are non-residents who routinely use the marina who do not have access to a private bathroom, or unless the convenient travel time from the slips to the residences is longer than five minutes.

Marina operators should post ample signs prohibiting the discharge of sanitary wastewater, dishwater, or greywater from boats into the waters of the State, including the marina basin, and also explaining the availability of pumpout services and public restroom facilities. Signs should also fully explain the procedures and rules governing the use of the pumpout facilities.

#### **4. Stormwater Management**

All stormwater management systems should be provided with a bypass or overflow system so that the peak discharge from a 10-year 24-hour storm will be safely conveyed to an erosion and scour-protected storm water outfall. All discharges shall be calculated using methods developed by the U.S. Soil Conservation Service and described in either their Technical Release 20 or 55.

For new construction:

- (1) The first one-half inch of runoff from the entire marina property for a 10-year 24-hour storm should be detained and released over a 24-hour period. Runoff should be controlled with a weir that will direct the first one-half inch of runoff to the are and bypass the rest to the receiving water body. This is known as control of the first flush and is important because this first one-half inch of runoff has high concentrations of pollutants compared with the bulk of the remaining runoff.
- (2) Use of infiltration practices may also be an acceptable alternative. Paving materials which allow for increased infiltration include permeable asphalt paving, paving blocks, and, in lighter use areas, coquina, gravel, oyster shells, or similar surfaces. Such infiltration practices are acceptable only in areas with appropriate soils, slopes, and depths to ground water. A strict maintenance schedule should be prepared and adhered to by the marinas operator. Porous asphalt should be used only as a last resort and only after a regular vacuuming schedule has been approved. This is needed because porous pavements can quickly become impermeable when clogged with small quantities of fines. Once they have become impermeable, their storm runoff benefits are nullified.
- (3) Other treatment practices for storm runoff may be considered on a case-by- case basis if they can achieve an equivalent removal efficiency of 80% of suspended solids in addition to removal of other pollutants as needed.

APPENDIX 16

MASSACHUSETTS RIVER PROTECTION ACT

By Mr. Durand, petition (accompanied by bill, Senate, No. 905) of Robert A. Durand, Steven Angelo, Pamela P. Resor, Lucile P. Hicks, Patricia A. Walrath, Barbara E. Gray and other members of the General Court for legislation to protect the rivers of the Commonwealth. Natural Resources and Agriculture.

**The Commonwealth of Massachusetts**

In the Year One Thousand Nine Hundred and Ninety-Two:

AN ACT TO PROTECT THE RIVERS OF THE COMMONWEALTH.

1     *Whereas*, The health of our river systems is a vital factor in  
2 the ecological, economic and public health of the commonwealth;  
3 and  
4     Rivers, streams and adjacent lands are an irreplaceable natural  
5 resource of the commonwealth that provide: municipal and  
6 industrial water supply and waste assimilation; hydropower;  
7 irrigation for agricultural production; transportation; canoeing,  
8 boating, hiking and other recreational opportunities; beautiful  
9 landscapes; recreational and commercial fishing and shellfishing;  
10 hunting and trapping opportunities; flyways and migratory paths  
11 for animals and birds; preferred habitat for many species that rely  
12 on the water for some part of their life cycle; and rich historical  
13 and cultural features that define the character of many of our cities  
14 and towns; and  
15     Undeveloped land areas along rivers, or their corridors, provide  
16 valuable ecological functions ranging from protecting and  
17 improving water quality, erosion control, flood management,  
18 wildlife habitat and travel paths, and groundwater replenishment;  
19 and  
20     The greatest threats to these resources at the present time are  
21 presented by land uses within river corridors that are damaging  
22 to the natural integrity of river systems; and  
23     A large portion of the more than ten thousand miles of river  
24 and stream corridors within the commonwealth has already

25 suffered significant degradation, contributing to persistent  
26 pollution problems, and most remaining undeveloped areas  
27 currently without adequate protection and threatened by  
28 degrading activities; and

29 The passage of this act will substantially assist the common-  
30 wealth in complying with the nonpoint source pollution control  
31 requirements and other water quality standards mandated by the  
32 federal government in its 1987 amendment to the Clean Water  
33 Act;

34 Therefore, the best interests of the commonwealth are served  
35 by policy and legislation recognizing the importance of protecting  
36 the natural integrity of the commonwealth's river systems and  
37 establishing effective means for such protection.

38 *Whereas*, The deferred operation of this act would tend to  
39 defeat its purpose, which is to protect riverfront lands and the  
40 attendant river values described above from ongoing degradation,  
41 therefore it is hereby declared to be an emergency law, necessary  
42 for the immediate preservation of the public convenience.

*Be it enacted by the Senate and House of Representatives in General  
Court assembled, and by the authority of the same, as follows:*

1 SECTION 1. The General Laws are hereby amended by  
2 inserting after chapter one hundred and thirty-one A the following  
3 chapter: —

#### 4 CHAPTER 131B.

#### 5 MASSACHUSETTS RIVER PROTECTION ACT.

6 Section 1. (a) The purposes of this act are to further the  
7 maintenance of safe and healthful conditions; to provide for the  
8 wise utilization of water and related land resources within an  
9 ecological context; to prevent and control water pollution,  
10 especially from nonpoint sources; to reduce erosion and  
11 sedimentation; to protect property values; to protect fish  
12 spawning grounds, aquatic life, bird and other wildlife habitat;  
13 to guide the placement of structures away from locations where  
14 there is significant risk of damage due to flooding or erosion; to  
15 protect archaeological and historic resources; to enhance the

16 positive functions of rivers as natural amenities in urban areas;  
17 to maintain natural vegetative cover along riverbanks while  
18 allowing reasonable visual and physical access to rivers; to  
19 promote scenic beauty and open space protection and to ensure  
20 that any development permitted within river corridors is designed,  
21 constructed and maintained in an environmentally sound manner.

22 (b) It shall be the policy of the commonwealth to protect the  
23 natural integrity of its rivers, tributaries and adjacent lands. In  
24 furtherance of this policy, the commonwealth shall encourage and  
25 support the establishment of a system of protected, connected  
26 open space lands along every river where feasible. In addition, the  
27 state shall promote the retention and restoration of naturally  
28 occurring flow patterns and volumes of water in rivers and their  
29 hydrologically connected systems. The state shall also encourage  
30 and support measures to reduce water pollution in order to satisfy  
31 or exceed federal clean water laws and standards. All public and  
32 private programs and actions affecting rivers shall be consistent  
33 with this policy.

34 Section 2. For the purposes of this chapter, the subsequent  
35 terms are defined as follows: —

36 "Bank," the portion of the land surface which normally abuts  
37 and confines a river, occurring between a river and a vegetated  
38 bordering wetland, floodplain or upland, the upper boundary of  
39 which is the first observable break in the slope or the mean annual  
40 flood level, whichever is lower, and the lower boundary of which  
41 is the mean annual low flow level.

42 "Basal area," the area in square feet of the cross section of a  
43 tree taken at breast height (4.5 feet above the ground).

44 "Clearing," the removal of more than one-half the cumulative  
45 total of basal area of all live trees five inches or more in diameter  
46 breast height during any ten-year period, or the removal of more  
47 than one-half of the total vegetative cover within the portion of  
48 each parcel that is within the riverfront area.

49 "Conservation commission," a commission established by a city  
50 or town pursuant to section eight C of chapter forty.

51 "Densely developed areas," any area of ten acres or more that  
52 as of the effective date of this act, is being utilized for intensive  
53 industrial, commercial or residential activities or combinations of

54 such activities, including, but not limited to: manufacturing,  
55 fabricating, wholesaling, warehousing or other commercial or  
56 industrial activities; retail trade and service activities; residential  
57 dwelling units at a density of three or more per two acres; and  
58 mixed or combined patterns of the above. Land which is zoned  
59 for intensive use but which is not being utilized for such use as  
60 of the effective date of this act, or which has been subdivided later  
61 than ninety days before the effective date of this act, shall not be  
62 considered a densely developed area for the purpose of this act.

63 "Land in agricultural use," land primarily used in raising  
64 animals, including, but not limited to, dairy cattle, beef cattle,  
65 poultry, sheep, swine, horses, ponies, mules, goats, bees and fur-  
66 bearing animals, for the purpose of selling such animals or a  
67 product derived from such animals in the regular course of  
68 business; or when primarily and directly used in a related manner  
69 which is incidental thereto and represents a customary and  
70 necessary use in raising such animals and preparing them or the  
71 products derived therefrom for market; or when primarily and  
72 directly used in raising fruits, vegetables, berries, nuts and other  
73 foods for human consumption, feed for animals, tobacco, flowers,  
74 sod, trees, nursery or greenhouse or greenhouse products, and  
75 ornamental plants and shrubs for the purpose of selling such  
76 products in the regular course of business; or when primarily and  
77 directly used in raising forest products and certified, by the state  
78 forester in consultation with the division of fisheries and wildlife,  
79 to be a planned program to improve the quality and quantity of  
80 a continuous crop for the purpose of selling such products in the  
81 regular course of business; or when primarily and directly used  
82 in a related manner which is incidental thereto and represents a  
83 customary and necessary use in raising such products and  
84 preparing them for market.

85 "Mean annual high-water line," the line, located within a river  
86 bank, that is apparent from visible markings, changes in the  
87 character of soils or vegetation due to the prolonged presence of  
88 water and which distinguishes between predominantly aquatic  
89 and predominantly terrestrial land. The mean high tide line shall  
90 serve as the mean annual high water line for tidal rivers.

91 "Nonconforming use," any excavation, structure, road,  
92 clearing, driveway, landscaping, utility lines, septic system, or

93 expansion of structures, within the riverfront area for which all  
94 necessary permits have been granted as of the effective date of  
95 this act.

96 "Normal maintenance or improvement," (a) all tilling and  
97 harvesting practices customarily employed to enhance existing  
98 growing conditions; (b) the pasturing of animals, including the  
99 construction and maintenance of such fences as may be required;  
100 (c) the use of fertilizers, pesticides, herbicides, and other materials  
101 subject to all state and federal laws and regulations governing the  
102 use thereof; (d) the construction, grading or restoring of filed  
103 ditches, subsurface drains, grass waterways, vents, access roads,  
104 farm ponds and similar projects to improve drainage, prevent  
105 erosion, provide more effective use of rainfall and improve  
106 equipment operation and efficiency, all in order to improve  
107 conditions for the growing of existing crops or raising of animals;  
108 (e) the cultivation of cranberries, including the following  
109 practices: (i) sanding operations using existing pits; (ii) cleaning  
110 of cross ditches, canals and natural waterways; (iii) repair and  
111 replacement but not enlargement of dikes and piping above and  
112 below ground; and (iv) repair, replacement and regrading of  
113 existing cranberry bogs; (f) repair and cleaning of reservoirs,  
114 dams and water storage systems, including related hydroelectric  
115 generating facilities, within the limits of existing water rights;  
116 (g) clearing and vegetative management for utility lines and  
117 related rights of way.

118 "Person," an individual, corporation, partnership, trust,  
119 association or other private entity or any officer, agent,  
120 department or instrumentality of the federal government or any  
121 state or its political subdivisions.

122 "Regional," relating to or serving two or more cities or towns.

123 "River," the rivers and perennial streams listed in a document  
124 entitled "Massachusetts River Classification Program, Part I  
125 Inventory of Rivers & Streams," prepared by the Department of  
126 Fisheries, Wildlife & Environmental Law Enforcement and the  
127 Department of Environmental Quality Engineering (July 1982) or  
128 as modified pursuant to chapter thirty A.

129 "Riverfront area," that area of land situated between a river's  
130 mean annual high-water line and a parallel line located one  
131 hundred and fifty feet away (measured outward horizontally) from

132 the river's mean annual high-water line, or the one hundred year  
133 floodplain contour (as may be determined on a nap prepared for  
134 each city and town by the Federal Emergency Management  
135 Agency or other reliable source), whichever is wider.

136 "Secretary," means the secretary of the executive office envi-  
137 ronmental affairs or such agencies or programs that the secretary  
138 shall designate to carry out the provisions of this chapter.

139 "Structure," anything built for the support, shelter or enclosure  
140 of persons, animals, goods, waste, or property of any kind,  
141 together with anything constructed or erected with a fixed location  
142 on or in the ground, but exclusive of utility lines, fences and  
143 structures less than two hundred cubic feet in volume, provided  
144 that there shall be no volume exception for containers of waste,  
145 manure, pesticides, toxic substances, herbicides, fertilizer or salt.

146 "Substantial expansion," an expansion of a structure that  
147 increases the existing floor area by more than twenty-five percent,  
148 or ten thousand square feet, whichever is smaller.

149 "Utility lines," pipes, wires, cables and other conduits, including  
150 the supporting structures and appurtenances, including any  
151 associated rights-of-way, that are used as part of a collection,  
152 transmission, distribution, or communication system and are  
153 designed for the transport of various matter, including but not  
154 limited to the following: electricity, telecommunications,  
155 petroleum and other toxic materials, natural gas, stormwater and  
156 wastewater, but excluding septic tanks and leach fields.

157 "Vegetated buffer strip," a strip of fifty feet or wider, measured  
158 horizontally outward from a river's mean annual high-water line,  
159 which is composed of a relatively undisturbed stand of trees,  
160 shrubs and other vegetation, from which no more than one-half  
161 the cumulative total of basal area of all live trees five inches or  
162 more in diameter breast height are removed during any ten-year  
163 period.

164 Section 3. (a) The construction, creation, placement or  
165 installation of any structure, road, clearing, driveway, septic tank  
166 or leaching field, underground storage tank, solid waste,  
167 excavation or fill exceeding ten cubic yards, or the substantial  
168 expansion of an existing structure shall be prohibited from the  
169 riverfront area; provided, however, that the local conservation  
170 commission may grant a variance from these prohibitions in

171 accordance with the provisions of section five. Utility  
172 lines carrying wastewater, stormwater, petroleum or other toxic  
173 materials shall be set back at least twenty-five feet horizontally  
174 outward from river's mean annual high-water line, provided that  
175 the secretary may grant a variance from this setback upon due  
176 considerations of any regulations and guidelines developed under  
177 subsection (c). River crossings by roads, driveways and utility  
178 lines are not prohibited by this subsection, but such crossings shall  
179 nevertheless remain subject to the Wetlands Protection Act and  
180 all applicable regulations thereunder.

181 (b) The following uses shall be exempt from the provisions of  
182 this subsection: (1) nonconforming uses which existed prior to  
183 the effective date of this act, provided, however, that the  
184 expansion of a nonconforming use shall be subject to the provi-  
185 sions of this chapter; (2) activities within the riverfront area  
186 which are consistent with standards and policies of the department  
187 of fisheries, wildlife, and environmental law enforcement and are  
188 designed to improve fisheries or wildlife habitat; (3) mainte-  
189 nance, operation, construction or other activities of the  
190 department of public works; (4) dams and related structures  
191 associated with the production of hydroelectricity shall be exempt  
192 from this subsection provided that said dams and structures are  
193 or become licensed by the Federal Energy Regulatory Commis-  
194 sion under Part I of the Federal Power Act; (5) construction,  
195 expansion, repair and maintenance of hydroelectric power, public  
196 water supply, local or regional wastewater treatment and their  
197 related, structures, systems, and facilities, but not including utility  
198 lines; (6) public access to rivers, public non-motorized vehicular  
199 access along rivers and public boat launchings; (7) use or  
200 implementation by the commonwealth or by any political  
201 subdivision thereof of engineering techniques and devices  
202 necessary for the purpose of bank stabilization, flood or erosion  
203 control, or improvement of navigation; (8) expansion, repair and  
204 maintenance of piers, docks, wharves and other similar structures  
205 which may be located completely or partially within the riverfront  
206 area, provided that such structures shall remain subject to  
207 statutory and regulatory promulgations under chapters ninety-  
208 one or one hundred and thirty-one A of the General Laws;  
209 (9) and normal maintenance or improvement of land in

10 agricultural use shall be exempt from the provisions of this  
1 subsection, provided that said maintenance or improvement,  
2 other than for the cultivation of cranberries, occurs more than  
3 twenty-five feet from the mean annual high-water line. Sub-  
4 section (a) shall not apply to (i) the portion of any river and  
5 adjacent land that is covered by a protective order issued pursuant  
6 to section seventeen B of chapter twenty-one or (ii) a substantial  
7 expansion of an existing structure located within the riverfront  
8 area is the expansion itself is not within the riverfront area.  
9 Notwithstanding any of the above, river banks should be retained  
10 in naturally vegetated and relatively undisturbed condition  
11 whenever possible.

12 (c) Pursuant to chapter thirty A, and within one year of the  
13 effective date of this chapter, the secretary shall adopt such regu-  
14 lations as are deemed necessary to carry out the purposes of this  
15 chapter. These regulations shall include criteria for the issuance  
16 of variances, including specifically (i) the substantial hardship  
17 variance authorized by sections three (a) and five (a) and  
18 (ii) the utility line setback variance granted by the secretary  
19 authorized by section three (a); criteria delimiting the exemptions  
20 set forth in section three (b); and criteria for determining  
21 violations in accordance with the provisions of section six. The  
22 secretary shall develop guidelines addressing suggested minimum  
23 standards for municipal zoning, land use controls and other  
24 mechanisms designed to carry out the purposes of this chapter.  
25 These guidelines may include: provisions governing building and  
26 structure size, setback and locations; the establishment of  
27 vegetated buffer strips; the location and mapping of riverfront  
28 areas; the establishment of densely developed area districts and  
29 other districts; and prevention of the direct discharge of untreated  
30 stormwater into rivers. The secretary is further directed to review  
31 and recommend modifications to programs and activities of the  
32 commonwealth as they affect the protection afforded by this  
33 chapter.

34 (d) Cities and towns are hereby authorized to adopt ordinances  
35 or by-laws consistent with this chapter and with section nine D  
36 of chapter forty A; provided, that such ordinances or by-laws may  
37 permit the clustering, so-called, of development outside of the  
38 riverfront area on properties whose boundaries include portions

249 of land within and without of the riverfront area. Cities and towns  
250 may, with the secretary's prior approval, define a riverfront area  
251 of less than one hundred and fifty feet for the portions of riverfront  
252 areas that qualify as densely developed areas; provided, however,  
253 that no city or town shall establish a riverfront area of less than  
254 twenty-five feet. Local modifications to the size of the riverfront  
255 area shall be consistent with the regulations and guidelines  
256 developed under section three (b) and locally adopted master  
257 plans, harbor plans, greenway plans, water resources management  
258 plans and open space and recreation plans, if any.

259 (e) If an owner of land in agricultural use which lies in whole  
260 or in part within the riverfront area proposes a change in use out  
261 of agricultural production and into residential, industrial or  
262 commercial use, said owner shall notify the city or town in which  
263 said land is located of his intention to convert or sell for  
264 conversion. For a period of one hundred and twenty days  
265 subsequent to such notification, the city or town shall have the  
266 option to purchase said land for a price determined to be the  
267 difference between the development value and the agricultural  
268 value of the land, to be determined by an impartial appraisal. After  
269 a public hearing, said city or town may assign said option to a  
270 nonprofit conservation organization under such terms and  
271 conditions as the mayor or board of selectmen deem appropriate.

272 (f) No conversion of land shall commence unless and until  
273 either said option period shall have expired or the land owner shall  
274 have been notified in writing by the mayor or board of selectmen  
275 of the city or town in question that said option shall not be  
276 exercised. Transfer of the option as provided for in this subsection  
277 shall have no effect on the duration of the option period which  
278 shall start with the initial notification made to the city or town  
279 by the landowner.

280 Section 4. Nothing in this chapter shall be construed to  
281 supersede the provisions of chapter one hundred thirty-one A or  
282 chapter ninety-one and regulations promulgated thereunder.  
283 Subject to the provisions of chapter ninety-one, the jurisdiction  
284 of municipal riverfront area protection ordinances or bylaws  
285 which carry out the purposes of this chapter in whole or in part  
286 may include any structure built on, over or abutting a dock, wharf,  
287 pier or other structure extending below the mean annual high

288 water line of a river or adjoining wetland. In accordance with this  
289 jurisdiction, cities and towns may enact ordinances and bylaws  
290 affecting structures which extend over the water or are placed on  
291 lands lying between high and low water lines or within wetlands.  
292 Facilities for regional wastewater treatment and their related  
293 structures and systems are exempt from this section.

294 Section 5. (a) The conservation commission, building  
295 inspector, planning board, health board or their duly authorized  
296 agents, and environmental police officers, are hereby empowered  
297 to take notice of this chapter and to enforce its provisions in the  
298 performance of their other duties, and to enter upon privately  
299 owned land to enforce the provisions of this chapter.

300 (b) The conservation commission shall have the power, after  
301 public hearing for which notice has been given by publication,  
302 posting and mailing to all parties in interest pursuant to regula-  
303 tions developed under section three (b) of this chapter, upon  
304 petition with respect to particular land or structures, and after due  
305 consideration of any regulations and guidelines developed under  
306 section three (b) of this chapter, to grant a variance from the  
307 activities prohibited under section three (a) of this chapter where  
308 the conservation commission specifically finds that a literal  
309 enforcement of the provisions of section three (a) of this chapter,  
310 in the context of the entire parcel or adjacent parcels owned by  
311 or under option to purchase by the petitioner or appellant, would  
312 involve a substantial hardship to the petitioner or appellant, and  
313 that desirable relief may be granted without substantial detriment  
314 to the public good and without nullifying or substantially  
315 derogating from the purpose and intent of this chapter.  
316 Reasonable fees may be collected and retained by the conservation  
317 commission to carry out the provisions of this section.

318 (c) An appeal resulting from any action of a conservation  
319 commission pursuant to subsection (b), or the failure of said  
320 commission to hold a public hearing and act upon a petition for  
321 variance within sixty days of the filing thereof may be made to  
322 the secretary under such conditions, including the payment of fees,  
323 as promulgated in regulations developed under the authority of  
324 section three (b) of this chapter. Appeals from decisions of the  
325 secretary may be made to the superior court in accordance with

326 the provisions of chapter two hundred and twelve and any other  
327 appropriate General Law.

328 Section 6. (a) Any person who willfully or negligently orders  
329 or conducts activity in violation of any provision of this  
330 chapter shall be punished by a fine of not less than two thousand  
331 five hundred dollars nor more than twenty-five thousand dollars  
332 per day of violation, or by imprisonment for not more than one  
333 year, or both. Any person receiving a subsequent conviction shall  
334 be punished by a fine of not less than five thousand dollars nor  
335 more than fifty thousand dollars per day of violation, or by  
336 imprisonment for not more than two years, or both.

337 (b) Any person who orders or conducts any activity in violation  
338 of this chapter shall be subject to a civil penalty of not less than  
339 five hundred dollars nor more than twenty-five thousand dollars  
340 per day of violation. Any person receiving a subsequent civil  
341 penalty shall be subject to a penalty of not less than one thousand  
342 dollars per day nor more than twenty-five thousand dollars per  
343 day of violation.

344 (c) In addition or as an alternative to (a) or (b) of this section,  
345 any person who orders or conducts any activity in violation of  
346 this chapter may be ordered to restore the affected riverfront area  
347 to its prior or an improved condition.

348 (d) Fines and penalties assessed under this chapter shall accrue  
349 to the conservation commission in each city or town in which the  
350 violation occurred. In a legal action in which the pleadings  
351 challenge the validity or legality of this chapter or any ordinance  
352 or bylaw adopted hereunder, the Attorney General shall be made  
353 a party until removed by the Attorney General's consent.

354 Section 7. The following parties may bring an action for  
355 injunctive relief or for civil penalties to enforce any provision of  
356 this chapter: (1) the commonwealth; (2) any governmental  
357 subdivision having jurisdiction over land or water upon which an  
358 alleged violation of this act is occurring or within the watershed  
359 where a violation is occurring; or (3) any ten citizens, which may  
360 include but need not be members of a nonprofit conservation  
361 organization, one of whom is a resident of the city or town in  
362 which the alleged violation of this act is occurring. Any party who  
363 brings an action under this section and is determined by the court  
364 to be the prevailing or substantially prevailing party may be

5 awarded costs and reasonable attorney and expert witness fees.  
6 The superior court shall have jurisdiction to enforce the provi-  
7 sions of this chapter.

8 Section 8. Actions and prosecutions under this chapter shall,  
9 unless otherwise expressly provided, be commenced within two  
0 years after the time when the offense was committed or discovered,  
1 whichever is later.

2 Section 9. If any section or provision of this chapter shall be  
3 held unenforceable by any court of competent jurisdiction, this  
4 chapter shall be construed as though such section or provision  
5 had not been included in it. If any section or provision of this  
6 chapter shall be susceptible of two constructions, one of which  
7 would render such section or provision invalid, then such  
8 section or provision shall be given the construction that would  
9 render it valid.

1 SECTION 2. Chapter forty A of the General Laws is hereby  
2 amended by inserting after section nine C the following new  
3 section: —

4 Section 9D. Cities and towns may adopt zoning ordinances or  
5 bylaws for the purpose of river and stream protection that are  
6 consistent with the provisions of chapter one hundred thirty-  
7 one B. The location of any zoning districts created by such  
8 ordinances or bylaws shall be shown on a zoning or overlay district  
9 map pursuant to section four. Cities and towns are hereby  
10 authorized to illustrate on their zoning or overlay district maps  
11 the location of any riverfront area as defined by chapter one  
12 hundred thirty-one B.

1 SECTION 3. The Secretary of Environmental Affairs shall  
2 submit any rules and regulations promulgated under the provi-  
3 sions of this act to the committee on natural resources and  
4 agriculture for its review within sixty days prior to the effective  
5 date of said regulations.

1 SECTION 4. The Secretary of Environmental Affairs is  
2 hereby directed to establish and appoint a Riverfront Advisory  
3 Committee for the purpose of participating in the drafting and

4 review of rules and regulations to carry out the purposes of this  
5 chapter. The advisory committee shall consist of ten members, five  
6 of whom shall represent environmental organizations in the  
7 commonwealth and five of whom shall represent land owners or  
8 the real estate community. At least two of the members shall own  
9 or have an interest in land located in a riverfront area, as defined  
10 in this chapter. The advisory committee shall meet with the  
11 secretary or the secretary's designee for the purpose of advising  
12 the secretary as to the criteria for variances, and shall also  
13 recommend any legislative proposals which would make the  
14 implementation of this act more efficient. Said meetings shall be  
15 at the discretion of the secretary, provided that the committee shall  
16 meet four times in the first twelve months after the effective date  
17 of this act, and at least once annually thereafter.

APPENDIX 17

MASSACHUSETTS ENDANGERED SPECIES ACT

## THE COMMONWEALTH OF MASSACHUSETTS

In the Year One Thousand Nine Hundred and Ninety

AN ACT TO PROVIDE PROTECTION FOR ENDANGERED AND THREATENED SPECIES.

Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, as follows:

SECTION 1. The seventh paragraph of section 6G of chapter 21 of the General Laws, as appearing in section 23 of chapter 653 of the acts of 1989, is hereby amended by striking out, in the fourth line the word "twenty-six A,".

SECTION 2. Section twenty-six A of chapter one hundred and thirty-one of the General Laws is hereby repealed.

SECTION 3. Section 90 of said chapter 131, as appearing in the 1988 Official Edition, is hereby amended by striking out, in line 38, the word "twenty-six A,".

SECTION 4. The General Laws are hereby amended by inserting after chapter 131 the following chapter:-

## CHAPTER 131A.

## MASSACHUSETTS ENDANGERED SPECIES ACT.

Section 1. The following words shall have the following meanings unless the context clearly requires otherwise:-

"Alter", to change the physical or biological condition of a habitat in any way that detrimentally affects the capacity of the habitat to support a population of endangered or threatened species.

"Animal", any member of the animal kingdom including, but not limited to, any mammal, bird, reptile, amphibian, fish, mollusk, crustacean, arthropod or other invertebrate or any part, product, egg or offspring or the dead body or any part thereof.

"Director", the director of the division of fisheries and wildlife within the department of fisheries, wildlife and environmental law enforcement, who shall have all powers hereunder that exist for purposes of chapter one hundred and thirty-one.

"Endangered species", any species of plant or animal in danger of extinction throughout all or a significant portion of its range including, but not

limited to, species listed from time to time as "endangered" under the provisions of the Federal Endangered Species Act of 1973, as amended, and species of plants or animals in danger of extirpation, as documented by biological research and inventory.

"Land in agricultural use", land primarily and directly used in raising animals including, but not limited to, dairy cattle, beef cattle, poultry, sheep, swine, horses, ponies, mules, goats, bees and fur-bearing animals, for the purpose of selling such animals or a product derived from such animals in the regular course of business; or when primarily and directly used in a related manner which is incidental thereto and represents a customary and necessary use in raising such animals and preparing them or the products derived therefrom for market; or when primarily and directly used in raising fruits, vegetables, berries, nuts and other foods for human consumption, feed for animals, tobacco, flowers, sod, trees, nursery or greenhouse products and ornamental plants and shrubs for the purpose of selling such products in the regular course of business; or when primarily and directly used in raising forest products and certified, in consultation with the division of fisheries and wildlife, by the state forester, to be a planned program to improve the quantity and quality of a continuous crop for the purpose of selling such products in the regular course of business; or when primarily and directly used in a related manner which is incidental thereto and represents a customary and necessary use in raising such products and preparing them for market.

"Land in aquacultural use", land and waters used primarily and directly in the commercial cultivation of aquatic organisms including finfish, mollusk or crustacean in a controlled environment.

"Normal maintenance or improvement", (a) all tilling and harvesting practices customarily employed to enhance existing growing conditions; (b) the pasturing of animals including the construction and maintenance of such fences as may be required; (c) the use of fertilizers, pesticides, herbicides and other materials, subject to all state and federal laws and regulations governing the use thereof; (d) the construction, grading or restoration of field ditches, subsurface drains, grass waterways, vents, access roads, farm ponds and similar projects to improve drainage, prevent erosion, provide more effective use of rainfall and improve equipment operation and efficiency, in order to improve conditions for the growing of existing crops or the raising of animals; (e) the cultivation of cranberries, including the following practices:

(i) sanding operations using existing pits; (ii) cleaning of cross ditches, canals and natural waterways; (iii) repair and replacement but not enlargement of water control structures, including flumes, pumps, dikes and piping above and below ground; (iv) repair, replacement and regrading of existing cranberry bogs; (v) repair and cleaning of reservoirs, dams and water storage systems within the limits of existing water rights.

"Person", an individual, corporation, partnership, trust, association or other private entity or any officer, agent, department or instrumentality of the federal government or any state or its political subdivisions.

"Plant", a member of the plant kingdom including seeds, roots, or other parts.

"Significant habitat", specific areas of the commonwealth, designated in accordance with section four, in which are found the physical or biological features important to the conservation of a threatened or endangered species population and which may require special management considerations or protection.

"Species", any subspecies or variety of plant or animal and any distinct plant or animal population which interbreeds or cross pollinates when mature.

"Species of special concern", any species of plant or animal which has been documented by biological research and inventory to have suffered a decline that could threaten the species if allowed to continue unchecked or that occurs in such small numbers or with such a restricted distribution or specialized habitat requirements that it could easily become threatened within the commonwealth.

"Take", in reference to animals, to harass, harm, pursue, hunt, shoot, hound, kill, trap, capture, collect, process, disrupt the nesting, breeding, feeding or migratory activity or attempt to engage in any such conduct, or to assist such conduct, and in reference to plants, to collect, pick, kill, transplant, cut or process or attempt to engage or to assist in any such conduct.

"Threatened species", any species of plant or animal likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range including, but not limited to, species listed from time to time as "threatened" under the provisions of the Federal Endangered Species Act of 1973, as amended, and any species declining or rare as determined by biological research and inventory and likely to become endangered in

the foreseeable future; provided, however, that the inclusion of any species on the Federal Threatened Species list shall not limit the discretion of the director to list said species as "endangered".

Section 2. Except as otherwise provided in this chapter, no person may take, possess, transport, export, process, sell or offer for sale, buy or offer to buy, nor shall a common or contract carrier knowingly transport or receive for shipment, any plant or animal species listed as endangered, threatened or of special concern or listed under the Federal Endangered Species Act.

Except as otherwise provided in this chapter, no person may alter significant habitat.

Section 3. Any person may transport, possess, or sell, in accordance with the terms of any necessary state and federal permit, any species appearing on any of the lists prepared in accordance with section four which enters the commonwealth from another state or from a point outside the territorial limits of the United States. A person may possess or propagate all plants listed as endangered, threatened or special concern; provided, however, that the sources for such propagation or possession shall not be taken from the wild. All nurserymen may sell all plants listed as endangered, threatened or of special concern; provided, however, that the sources for such sale shall not be taken from the wild.

The director may permit the taking, possession, purchase, sale, transportation, exportation or shipment of any species appearing on the list of endangered or threatened species or species of special concern developed by the director pursuant to section four for scientific or educational purposes, or for or from propagation in captivity and may permit the taking of special concern species for the purposes of falconry pursuant to regulations promulgated by the director.

The director may permit the removal, capture, or destruction of any species appearing on the list of endangered or threatened species or species of special concern developed by the director pursuant to section four to protect human health, when a public health hazard exists as certified by the department of public health.

A landowner may construct a single family house covering no more than three thousand square feet of ground and install any necessary utilities to service said house and construct in a reasonable fashion a single access driveway to the nearest public or private way on a lot having an area of at

least three acres; provided, however, that the lot on which said construction takes place was owned by said landowner and in existence on January first, nineteen hundred and ninety; and provided, further, that said lot was not held in common ownership with any adjoining land as of said date. For purposes of this paragraph, the phrase "in existence" shall mean a lot shown on a definitive plan that has received final approval under chapter forty-one or shown on a plan that has been endorsed under section eighty-one P of said chapter.

Section 4. The director shall conduct investigations and consult with the nongame advisory committee established pursuant to section five B of chapter one hundred and thirty-one in order to determine whether any species of plant or animal constitutes an endangered or threatened species or species of special concern.

Criteria for determining endangered, threatened or special concern status shall be based on biological data including, but not limited to, reproductive and population status and trends, whether the species is native or has been introduced, vulnerability, as determined by threats to the species or its habitat, specialization, as determined by unique habitat requirements; restricted distribution, as determined by limited or disjunct geographic range and rarity, as determined by a limited number of occurrences or by occurrence in limited numbers.

The director shall list endangered, threatened and special concern species and shall review said list at least once every five years for the purpose of listing or delisting species. The burden of proof for delisting species shall be on the person requesting such change in status. The establishment of said list and any proposed changes thereto shall be by regulation after a public hearing and shall be subject to the provisions of chapter thirty A.

Upon the effective date of the regulations adopted hereunder the director shall designate significant habitats of endangered or threatened species populations by regulation, after a public hearing, and subject to the provisions of chapter thirty A, on the basis of the best scientific evidence available, after taking into consideration the following criteria:

- (i) the current and foreseeable threats to the population or its habitat;
- (ii) the size of the population;
- (iii) the potential benefits of designation to the population and to the status and welfare of the species generally; and
- (iv) current and foreseeable uses of the land.

thereof, which established such designation, as it affects the appealing record owner.

In addition to the aforementioned appeal, owners of land containing significant habitat may, within twenty-one days of designation, petition the director to consider purchasing such habitat from monies appropriated by the general court or from bond funds.

The division of fisheries and wildlife shall, after a public hearing and in accordance with the procedures set forth in chapter thirty A, adopt any regulations necessary to implement the provisions of this chapter. Said regulations shall be promulgated with the advice and assistance of a technical advisory committee to consist of nine persons to be appointed by the director; two of whom shall be university or college professors from two separate educational institutions with expertise in endangered species biology, one of whom shall be a member of a Massachusetts environmental organization; one of whom shall be a member of the nongame advisory committee established pursuant to section five B of chapter one hundred and thirty-one; one of whom shall be a member of the sporting community, one of whom shall be a representative of the utilities industry; one of whom shall be a representative of the real estate development industry, one of whom shall be a member of the staff of the department of public works and one of whom shall be a representative of agricultural interests.

The division of fisheries and wildlife shall, at least sixty days prior to filing such regulations under the provisions of section five of chapter thirty A, file such regulations with the clerk of the house of representatives who shall forward such regulations to the joint committee on natural resources and agriculture for its review at least sixty days prior to the effective date of said regulations. Said regulations shall include, but not be limited to: criteria to be applied by the director in determining which activities will reduce the viability of significant habitat to support endangered or threatened species; criteria to further define alteration of a significant habitat; and other regulations designed to carry out the purposes of this chapter. This provision shall not affect existing regulations listing endangered, threatened or special concern species in effect on the effective date of this chapter.

All agencies, departments, boards, commissions and authorities shall utilize their authorities in furtherance of the purposes of this chapter and

shall review, evaluate and determine the impact on endangered, threatened and special concern species of all works, projects or activities conducted by them and shall use all practicable means and measures to avoid or minimize damage to such species.

Section 5. (a) Before any person alters a significant habitat, except as provided in paragraph (b) below or in paragraph four of section three, such person shall submit to the director the following:

- (i) full plans and a complete description of the project and the anticipated use;
- (ii) alternatives to the proposed project and anticipated use;
- (iii) impacts of the proposed project and anticipated use on the subject species;
- (iv) full plans for the protection of any endangered or threatened species present and the mitigation measures to be taken to provide amelioration of the impact;
- (v) the potential economic effects of the proposed project on the person and the community; and
- (vi), any additional information the director may require.

No alteration of a significant habitat may commence without a written permit issued by the director. The director shall render a decision within forty-five days of receiving all required information. A permit shall be granted only upon a finding by the director that the proposed action will not reduce the viability of the significant habitat to support the endangered or threatened species population involved.

Vegetation management activities conducted by gas or electric utility companies on existing rights of way for which the natural heritage and endangered species program of the division of fisheries and wildlife has reviewed vegetation management and yearly operational plans therefor and has made recommendations with respect to avoidance, minimization or mitigation of impacts on endangered, threatened or special concern species, and for which said utility company has incorporated any such avoidance, minimization or mitigation measures into said plans, shall forthwith be issued a permit by the director without further conditions; provided, however, that the permit may be conditioned upon implementation of any such avoidance, minimization or mitigation measures. Failure of the natural heritage and endangered species program of the division of fisheries and wildlife to make any such recommendations within

The director shall review and designate qualifying significant habitats on a yearly basis and may, from time to time, revise such designation by regulation as appropriate. The designation and revision of designation of significant habitat by the director shall constitute the adoption of regulations subject to the provisions of chapter thirty A. The location of designated significant habitat shall be marked on maps available for inspection by record owners and shall be described by metes and bounds or another adequate method which identifies the boundaries of the significant habitat.

Record owners of lands or interests in lands containing habitat to be so designated shall be notified by certified mail not less than thirty days prior to the public hearing regarding such designation. Upon the adoption of the regulation designating the significant habitat, the director shall cause a document identifying the location of each habitat so designated, together with a list of the assessed owners of such lands, to be recorded in the proper registry of deeds or, if such lands are registered, in the registry district of the land court, and shall send, by certified mail, a copy thereof to each record owner. Maps showing the location of significant habitats shall be made available to local zoning boards, planning boards and conservation commissions or, where none of the above exist, the local board of selectmen or mayor and the city council, in those communities where such habitats occur.

Local zoning boards, planning boards or conservation commissions shall notify the director, in writing, of any and all petitions, requests or applications for permits, orders or approvals regarding proposed activity within significant habitats within twenty-one days of the filing of such petitions, requests or applications.

Record owners of lands or interests in land containing significant habitat may appeal the director's designation of such significant habitat to the secretary of the office of environmental affairs by sending, by certified mail, a notice of appeal to said secretary within twenty-one days of such designation. Said secretary shall hold a hearing on such appeal within a reasonable time, and in no case later than one hundred and twenty days from the date of such designation. Said secretary shall consider the information and testimony presented at the hearing and shall make a determination thereon within sixty days. Said secretary shall reverse the decision of the director only upon a finding that such decision was without substantial basis in fact. Upon the reversal of a decision, the director shall rescind the regulation, or a part

ninety days of receipt of vegetation management or yearly operating plans for review shall be equivalent to the issuance of a permit by the director.

(b) Any work, project or activity of any person for which (i) a final environmental impact report certified by the secretary of environmental affairs as adequately and properly complying with the provisions of sections sixty-one to sixty-two E of chapter thirty has been issued, or (ii), an environmental notification form has been filed and the secretary has certified that an environmental impact report is not required, and for which the natural heritage and endangered species program of the division of fisheries and wildlife has reviewed the project and made recommendations with respect to avoidance, minimization or mitigation of impacts on endangered, threatened or special concern species, and for which the project proponent has incorporated any such avoidance, minimization or mitigation measures in the project design, shall forthwith be issued a permit by the director without further conditions, except that the permit may be conditioned upon implementation of any such avoidance, minimization or mitigation measures. Failure of the natural heritage and endangered species program of the division of fisheries and wildlife to make any such recommendations within the following time periods shall be equivalent to the issuance of a permit by the director: (A) if an environmental impact report is not required, ninety days after the secretary issues a notice of the receipt of an environmental notification form, as described in section sixty-two A of chapter thirty and the regulations thereunder; or (B) if an environmental impact report is required, prior to certification by the secretary that the final environmental impact report adequately and properly complies with sections sixty-one to sixty-two E of chapter thirty.

(c) Record owners of lands or interests in lands aggrieved by a decision of the director or by his failure to act hereunder may appeal to the secretary of the office of environmental affairs by sending, by certified mail, a notice of appeal to the secretary within twenty-one days of such decision or failure to act. The secretary shall hold a hearing on such appeal within a reasonable time, and in no case later than one hundred twenty days from the date of such decision. The secretary shall consider the information and testimony presented at the hearing and shall make a determination thereon within sixty days. The secretary shall overturn the decision of the director only upon a finding that it was without substantial basis in fact, but shall fully examine on the merits any appeal involving the director's failure to act.

(d) The provisions of this section shall not apply to work performed in the normal maintenance or improvement on land in agricultural or aquacultural use.

(e) In addition to the appeal described in subparagraph (c), a landowner aggrieved by a decision of the director may file an action in superior court department of the trial court to determine whether such decision constitutes a taking requiring compensation under the Constitution of the United States.

Section 6. (a) Any person who violates the provisions of the first paragraph of section two or the rules and regulations promulgated thereunder, shall be punished by a fine of not less than five hundred dollars or imprisonment for not more than ninety days or both such fine and imprisonment. Upon a second or subsequent conviction such person shall be punished by a fine of not less than five thousand dollars nor more than ten thousand dollars or by imprisonment for not more than one hundred and eighty days or both such fine and imprisonment.

(b) Any person who violates the provisions of the second paragraph of section two or rules and regulations promulgated thereunder, shall be punished by a fine of not less than one thousand dollars nor more than ten thousand dollars or by imprisonment for not more than ninety days or both such fine and imprisonment. Upon a subsequent conviction, such person shall be punished by a fine of not less than ten thousand dollars nor more than twenty thousand dollars or by imprisonment for not more than one hundred and eighty days or both such fine and imprisonment. In addition or as an alternative to such penalties, any such person may be ordered to restore the significant habitat to its prior condition.

(c) The commission of a prohibited act with respect to each individual animal or plant, or part thereof, shall constitute a separate violation.

SECTION 5. The division of fisheries and wildlife in the department of fisheries, wildlife and environmental law enforcement shall adopt regulations to implement the provisions of chapter one hundred and thirty-one A of the General Laws prior to December thirty-first, nineteen hundred and ninety-one.

House of Representatives, December 17, 1990.

Passed to be enacted,

*George Lenihan*, Speaker.

In Senate, December 17, 1990.

Passed to be enacted, *William W. Bulger*, President.

December 27, 1990.

Approved,

*Michael Dukakis* Governor.

APPENDIX 18

USEPA'S NONPOINT SOURCE POLLUTION MANAGEMENT MEASURES  
FOR MARINAS AND RECREATIONAL BOATING

PROPERTY OF NEW JERSEY  
D.E.P. INFORMATION  
RESOURCE CENTER

**CHAPTER 5. MANAGEMENT MEASURES FOR MARINAS AND  
RECREATIONAL BOATING**

SOURCE: Proposed Guidance Specifying Management Measures for  
Sources of Nonpoint Pollution in Coastal Waters. U.S. Environmental  
Protection Agency, 1991.

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## CHAPTER 5

### MANAGEMENT MEASURES FOR MARINAS AND RECREATIONAL BOATING

#### I. INTRODUCTION

Properly designed and operated marinas can reduce impacts to the marine environment, as well as benefit the boating public. Many NPS impacts of boats can more easily be prevented and contained at the centralized site a marina provides, than at individual docks and moorings. Denying opportunities for marina development does not necessarily prevent NPS impacts. Ensuring the best possible siting for marinas, as well as best available design and construction practices and ensuring appropriate marina and boating operations and maintenance procedures can greatly reduce NPS pollution from marinas.

The management measures or systems of best management practices described in this chapter are designed to reduce NPS pollution from marinas and recreational boating. Effective implementation will:

- Prevent the introduction of nonpoint source pollutants (or impacts) at the source and/or,
- Reduce the delivery of pollutants from the source to water resources.

This chapter specifies the management measures (in Sections III.B., IV.B., and V.B.) that represent the best systems of practices available to prevent NPS pollution from marinas and recreational boating or reduce NPS pollutant delivery from these sources to coastal waters. The management measures are grouped in three categories: siting (III.B.), design (IV.B.), and operation and maintenance (V.B.). For each of these three categories, following the management measures, the guidance provides information on a variety of practices that may be used as tools to accomplish the management measures. An attempt is also made to identify effectiveness of these measures, or performance goals that can be achieved by these measures. Comments are welcome on the composition, effectiveness and cost of these management measures.

It is expected that each coastal State's decision on implementation of these management measures will be based on the management strategy developed as part of its vision for the future. Pollution prevention should be at the fore of any such strategy. Hence, while flexibility is a keystone we expect that all States will need a process for State or local-level review/management of environmental impacts from marinas and recreational boating.

A site selection process based upon a clear understanding of potential water quality impacts is the most important factor for avoidance of NPS pollution from marina development and operation. Determination of potential water quality impacts as part of the marina siting process can avoid NPS pollution impacts and degradation of the water body, also protecting designated uses.

## A. Nonpoint Source Pollution Impacts from Marinas and Associated Boating Activities

Nonpoint pollution from marinas and recreational boating activities may result in detectable adverse environmental effects to nearby water column and benthic resources. These impacts can be caused by physical and chemical disturbances. A few important examples of these impacts include:

- Toxicity in the water column, both lethal and sublethal, related to decreased levels of dissolved oxygen and elevated levels of metals and petroleum hydrocarbons,
- Increased levels of metals and organic chemicals in the tissues of organisms such as algae, oysters, mussels or other filter feeders,
- Increased levels of pollutants in sediments resulting in toxicity or avoidance of the area by benthic organisms,
- Levels of pathogen indicators that result in shellfish bed or swimming area closure,
- Disruption of the bottom during dredging and positioning of pilings may destroy habitat, resuspend bottom sediment (resulting in the re-introduction of toxic substances into the water column), and increase turbidity which affects the photosynthetic activity of algae and estuarine vegetation, and
- Shoaling, and shoreline and shallow area erosion due to bulkheading, motorboat wake, or changes in circulation.

Degradation of the nearby biological community and sediment should also be considered during the process of assessing NPS pollution impacts from marina development and operation. (EPA is developing methods for assessing risks associated with toxic substances in sediments and standardized bioassays to assess chronic effects and bioaccumulation resulting from sediment contamination. Guidance for the development of biological and wildlife criteria are also being developed by EPA.) Following is a list of specific pollutants and measures of pollution, as well as affected communities that should be considered in siting a marina:

- (1) Chemical
  - (a) dissolved oxygen (DO)
  - (b) nutrients (nitrogen and phosphorus)
  - (c) pathogens (coliform as indicator)
  - (d) metals (copper, lead, tin)
  - (e) petroleum hydrocarbons
  - (f) total suspended solids

- (g) biochemical oxygen demand (BOD)
- (2) Biological
  - (a) endangered species
  - (b) bird rookeries
  - (c) benthos
  - (d) fish, shellfish and corals
  - (e) submerged aquatic vegetation
  - (f) wetlands
- (3) Sediments
  - (a) contaminated sediments (criteria under development)
  - (b) turbidity

## **B. Sources of NPS Impacts**

Some sources at marinas are point sources. These include sewage discharges, both from marinas and from boats, and stormwater discharges. In addition, an entire marina may be potentially be required to apply for and receive permits under the NPDES stormwater permit program. to the extent they are required to do so, they are not covered by the coastal nonpoint source pollution control program. However, many marinas are not currently required to apply for and receive NPDES permits. The nonpoint source pollution control program and these management measures guidelines are applicable to these marinas. Similarly, some aspects of marina dredging may be subject to the section 404 permits for the discharge of dredge and fill material. This guidance is not applicable to dredging subject to section 404 permit requirements. There are essentially three source categories of marina and boating operations that may cause nonpoint pollution:

- (1) Marina Construction
- (2) Marina and boat operation, repair, and maintenance
- (3) Dredging and dredge disposal

The most important step in controlling the impacts of these source categories is appropriate marina siting. Marinas should be sited adjacent to deep waters, in locations where flushing is adequate to avoid shoaling and contamination problems, and where effects on important habitat are minimized.

Runoff from marina construction activities is similar to that of any type of urban development. (See discussion under appropriate chapter for management measures.) Installment of pilings can cause considerable turbidity (as well as possible contaminant resuspension), impairing

photosynthesis and harming benthos. Dredging during construction has essentially the same effects as dredging for maintenance, as discussed below.

Day-to-day marina operation can be a source of stormwater runoff from impervious surfaces, including car parking lots and buildings and sanitary and greywater disposal on land (e.g., poorly functioning or overloaded septic systems in sandy coastal soils). Contaminants from land-side boat maintenance projects, including hull scraping, sanding, welding, painting and varnishing can be carried in stormwater runoff or by air.

Boat maintenance that occurs in the water will be a direct source of contaminants (as described above). Chemicals, such as chromated copper arsenic-, copper- and tributyltin-based antifouling paints used to protect boats and wooden docks from destruction and fouling, may leach heavy metals directly into surrounding waters. Debris lost or thrown overboard is another problem area.

Concerns related to boat operation include fueling operations, bilge water discharge, accidental fuel or oil spills, propwash within channels (causing turbidity and resuspension of possible contaminated sediments) and shoreline erosion due to motorboat wake. Disposal of sanitary wastes, both legal and illegal (both from boats fitted with marine sanitation devices (MSDs) and those without), and discharge of greywater are other sources.

Another category of NPS pollution from marinas is dredging. For the purposes of this chapter, only the dredging within the marina itself and dredging to ensure access from the marina to the channel is discussed.

Dredging disturbs bottom habitat communities temporarily, increases turbidity (possibly disrupting photosynthetic activity), and may resuspend contaminated sediments. Disposal of dredged material in shallow water or in wetlands may smother habitat, contaminate sites and increase turbidity.

Some of the most visible controversy associated with recreational boating deals with the disposal of sanitary wastes. As a source of fresh pathogen pollution, untreated sewage discharges from boats have a greater potential for the presence and survival of disease-causing organisms than do discharges from treated municipal sewage sources. However, boats are considered point sources under the CWA, and sewage discharges from boats are regulated under section 312 of the CWA.

### **C. Federal Programs that Apply to Marinas and Recreational Boating**

The siting and permitting process which marinas are subject to varies from State to State. State and Federal agencies both play a role in this process. Boats are not required to be equipped with a MSD. However, if a boat does have a MSD, the MSD has to meet certain standards. Section 312 of the CWA required EPA to develop standards for MSD discharges to prevent the discharge of untreated or inadequately treated sewage into or upon the navigable waters of the

U.S. from new and existing vessels. To meet those standards, the CWA required the Coast Guard to promulgate regulations governing design, construction, installation, and use of MSDs. Management measures to address regulated MSDs will not be a part of this chapter, since they are already regulated under the CWA. However, sanitary wastes will be included in regard to siting and design of marinas. In addition to EPA standards for MSDs, EPA may allow a State to prohibit all discharges (treated or untreated) from marine toilets, thus declaring the area a "No Discharge Zone." Any State may petition the EPA Administrator for a "No Discharge Zone" to be designated in some or all of the waters of the state. However, EPA must ensure these waters meet certain tests before considering granting the petition.

Under Section 10 of the Rivers and Harbors Act of 1899, the Army Corps of Engineers (COE) regulates all work and structures in navigable waters of the United States. Under Section 404 of the CWA, COE permits are issued or denied to regulate discharges of dredged or fill materials in navigable waters of the United States including wetlands. Guidelines which the COE applies in evaluating disposal sites for dredged or fill material are developed by EPA. The expressed goal of the 404 program is to protect water quality, aquatic resources and wetlands.

The Food and Drug Administration has established fecal coliform standards for certified shellfish growing waters. Shellfish cannot be harvested in waters with fecal coliform counts of 14/100 ml or higher. Each coastal State regulates its own shellfish sanitation program under the voluntary National Shellfish Sanitation Program. States must participate if they wish to export shellfish across State lines. Various approaches are used to comply.

#### **D. State Programs**

Some States issue separate dredge and fill, marshlands or wetlands permits for marina developments, while other States review Federal permit applications and do not issue State permits. All States with Federally approved coastal programs have the authority to object to Section 10/Section 404 permits if the proposed action is inconsistent with the State's Coastal Zone Management Program. Some States require permits for the use of State water bottomlands. All States have authority under the Clean Water Act to issue Section 401 water quality certifications for Federally permitted actions as part of their water quality standards program.

Some States also have a State coastal zone management permit providing them authority over development activities in areas located within their defined coastal zone. Alternatively, or in addition to this permitting authority, some States have regulatory planning authority in given areas of the coast, allowing them to affect the siting of marinas, if not their actual design and construction.

#### **E. Management Measures**

Control of NPS pollution from marinas and recreational boating requires the combination and coordination of many management measures: siting and design considerations, implementation

of operation and maintenance plans, and public education. Management measures for marinas and recreational boating are organized under the following activities:

- Siting,
- Design, and
- Operation and maintenance.

As with all other management measures in this guidance, there may be more than one way to achieve the same or better pollutant reduction than achieved with the specified management measure. Approaches that equal or exceed the performance of the specified management measures, without resulting in harmful side effects, are for purposes of this guidance considered as alternative management measures.

#### **F. Applicability of Management Measures**

These management measures are applicable to:

- Any commercial facility which contains five or more slips, or any facility where a boat for hire is docked, or a boat maintenance/repair yard that is on or adjacent to the water.
- Any residential or planned community marina with ten or more slips.
- Public or commercial boat ramps.
- Any mooring field where 10 or more boats are anchored on a regular basis.
- Any Federal, State, or local facility that involves docking of five or more boats or involves boat maintenance/repair that is on or adjacent to the water.

States may wish to apply these measures to other situations as well.

## **II. MANAGEMENT MEASURES FOR MARINA SITING**

### **A. Environmental Concerns**

The marina siting Management Measures, listed in Section B below, are designed to address the following water quality concerns.

Maintaining water quality within a marina basin depends primarily on how readily the marina renews its waters, a process aptly known as "flushing." If a marina is not properly flushed, pollutants will concentrate to unacceptable levels resulting in impacts to biological resources.

Methods approved for analyzing the flushing potential of a marina are discussed under the Water Quality Assessment section of this chapter.

As discussed in more detail in another chapter of this guidance, wetlands perform many vital functions, such as serving as highly productive nursery areas for aquatic and terrestrial organisms, providing nutrients, reducing flood damages, and maintaining water quality by trapping sediment and filtering pollutants. There is a significant possibility that NPS pollution from marinas could result in loss of are values.

Marinas are commonly located in biologically productive areas that are sensitive to disturbances. The popularity of shellfish make them significant commercial and recreational resources. Submerged aquatic vegetation (SAV) are important because of the shelter which they provide to aquatic organisms, the food source which they provide to waterfowl, and their natural filtering capability to remove suspended solids and disperse wave energy. Benthic resources should be protected because they are important in the food chain, they are also valuable as commercial and recreational food sources. Critical habitats are areas which are essential for maintaining wildlife, particularly for winter survival and breeding, and as nesting areas for migrating species. Highly productive primary nursery areas for aquatic organisms (e.g., fish or crustaceans) should also be considered critical habitats. Marina-related dredging may impact shellfish beds, SAVs, or other benthic resources and habitats directly through construction activities or indirectly through increased turbidity and sediment deposition. Resuspension of sediments by boats also may affect biological resources adversely.

## **B. Management Measures**

This section contains the management measures to be applied in the siting of marinas:

- (1) Site marinas such that tides and currents are adequate to flush the site, or renew its water regularly. Marina construction should only be allowed in areas where a water quality assessment reveals that standards will not be violated and biological resources dependent upon clean water will not be degraded.
- (2) Site marinas adjacent to deep water to avoid or minimize dredging needed. The area to be dredged should be the minimum needed for the marina itself, including the docking areas, fairways, and channels, and for other maneuvering areas that are needed. In no case should the bottom of the marina be deeper than the adjacent open water. During dredging operations, turbidity should be minimized through the proper placement of silt screens or turbidity curtains.
- (3) Site marinas near currently permitted public areas for disposal of dredged materials.
- (4) Site marinas away from wetlands, shellfish resources, submerged aquatic vegetation, and critical habitat areas.

- (5) Locate piers such that shading of submerged aquatic vegetation is minimized.
- (6) Site marinas such that they have easy access to roads, utilities, public sewers (where available), and water lines, to avoid NPS impacts associated with developing these services.
- (7) Site marinas away from surface or ground water that is used for water supply.

### **C. Marina Siting Practices**

This section provides technical guidance on practices that may be used as tools to assist in the implementation of the management measures set forth in Section III.B. above.

#### **1. Water Quality**

To aid in the determination as to whether a site is appropriate for marina construction, a water quality assessment of the proposed project is recommended. Also, the cumulative impacts of proposed new and existing development projects should be considered. For instance, if a group of small marinas were proposed in one area, whether by design or by chance, the impact of the marinas taken together should be examined. Therefore, even if any one of the projects would cause negligible impacts on water quality, one or more projects may be precluded based on the cumulative impacts. Alternately, each marina developer may be required to modify their project so that the cumulative impacts of all the projects can be made acceptable. In any event, based on the ecological sensitivity of the proposed site, a water quality monitoring plan may be required for the periods of time prior to, during, and after construction.

A water quality assessment should include appropriate modeling, monitoring, and data analysis to determine the proposed marina's impact on:

- (1) Fecal coliform concentrations (to indicate potential impacts due to microbial pathogens),
- (2) Dissolved oxygen concentrations, and
- (3) Other parameters, if there is a concern that the water quality standards for those parameters may be violated.

Examples of other types of parameters which could be of concern include:

- Various polycyclic aromatic hydrocarbons (derived from petroleum products) - Other toxic organics (i.e. PCB's, benzene, various solvents, etc.)
- Heavy metals such as chromium, copper, cadmium, mercury, lead, nickel, and zinc, and

- Nutrients (i.e. nitrogen and phosphorus).

The discussion below provides guidance in assuring adequate flushing, compliance with water quality standards, and protection of shellfish harvest areas. The water quality assessment may be divided into a two tiers, as follows:

**Tier 1** - If screening methods are determined to be appropriate for the system being investigated, the initial screening methods described in this guidance can be used. Screening methods are acceptable provided that they are appropriate for the system and they do not predict water quality problems.

**Tier 2** - If screening-level analysis predicts water quality problems, then additional, more detailed, investigations of water quality impacts should be performed.

A valid water quality assessment should include, at a minimum, appropriate modeling, monitoring, and data analysis to determine:

- The flushing characteristics of the proposed marina.
- The spatial extent of the shellfish harvest closure zone resulting from presumed or actual pathogen contamination.
- If the 24-hour average dissolved oxygen concentration and the one-hour (or instantaneous) minimum dissolved oxygen concentration both inside the marina and in adjacent ambient waters would violate state water quality standards. (The national recommended water quality criteria are dependent upon water temperature.)

For each of the items described above, the analyses should be conducted based on the following conditions:

- (1) Average ambient water temperature and salinity for the critical season of marina operation. The critical season is defined as the season which has the highest potential for adverse water quality impacts.
- (2) For tidally influenced sites, the average tidal conditions (high and low tide elevations, tide range, and current velocities) for the critical season of marina operation.
- (3) Sediment Oxygen Demand (SOD) rates of at least 2.0 gm/sq m/d at 20 degrees C. SOD varies from area to area. The default value should be used unless it can be demonstrated that another value is more appropriate. This base rate should be adjusted to the temperature of the analysis based on the following formula:

$$SOD_T = SOD_{20} (1.065)^{(T - 20)}$$

Where,

$SOD_{20}$  = SOD at 20° Celsius

$SOD_T$  = SOD at temperature of analysis

T = Temperature in degrees Celsius

- (4) Seasonal average background  $BOD_5$  and  $BOD_{20}$  concentrations of the adjacent ambient waters.
- (5) Seasonal 24-hour average background dissolved oxygen concentrations of the adjacent ambient water.
- (6) A typical instantaneous minimum and maximum dissolved oxygen concentration determined by continuous dissolved oxygen, temperature, and possibly salinity monitoring of the adjacent waters at the site. The monitoring should be conducted during the season of interest. Temperatures should approximate the average critical season temperature identified in 1) above.
- (7) Additional or alternative conditions may be required or approved if there is documented evidence that the additions or alternatives are appropriate.

a. Flushing of marina sites

The method chosen to estimate expected flushing from a marina site depends upon the hydrographic characteristics of the location. Marinas anticipated to be located within a confined area with one or two relatively narrow openings would have flushing characteristics considerably different from marinas located directly on larger bays or estuaries or along river shorelines. Two openings may improve flushing in semi-enclosed marina basins.

Flushing time within a semi-enclosed area can be estimated using simplified dilution calculations. The parameters required for the estimation are:

- Average marina depth at low and high tide following completion of dredging, based upon the representative tidal range of the area,
- Volume of non-tidal freshwater inflow into the marina,
- Surface area of the marina, and
- The percentage of discharged water returning to the basin on the following tidal cycle.

The flushing time of a semi-enclosed marina can be approximated by the following equation:

$$T_f = \frac{T_c \text{Log} D}{\text{Log} \frac{AL + \text{BAR} - IT_c}{AH}}$$

where:

- $T_f$  = Time of flushing (hours)
- $T_c$  = Tidal cycle, high tide to high tide (hours)
- $A$  = Surface area of marina ( $m^2$ )
- $D$  = Desired dilution factor
- $R$  = Range of tide (m)
- $b$  = Return flow factor (dimensionless)
- $I$  = Non-tidal freshwater inflow ( $m^3/\text{hour}$ )
- $L$  = Average depth at low tide (m)
- $H$  = Average depth at high tide (m)

The parameter "b" represents the percentage of the tidal prism ("AR" in Equation 1) that was previously flushed from the marina on the outgoing tide; has returned on the subsequent incoming tide; and is expressed as a decimal fraction. For example, if a river had a relatively low flow rate, water discharged from a marina at the completion of one tidal cycle may still exist in proximity to the marina inlet and portions may flow back into the marina on the incoming tide. This water mass portion would not be considered as aiding flushing for water quality considerations.

Non-tidal freshwater inflow from runoff or stream discharge into the marina basin can be estimated using hydrologic techniques. If " $IT_c$ ," is much less than " $AL + \text{BAR}$ ," this component of the equation can be ignored. Estimating the flushing time of a marina may be dependent upon several factors. Additional information on estimating flushing time can be found in the Coastal Marinas Assessment Handbook (EPA, 1985) or Draft Final Report on Marina Water Quality Models (Morton, M. and Moustafa, Z., 1991). Many characteristics of the marina site, including location relative to other water bodies, ambient water quality, biological activity, total volume and expected marina activity, and type and volume of discharge, would all affect flushing time. For most cases a two to four day flushing time is satisfactory while longer flushing times could result in unacceptable buildup of toxic pollutants or decrease in dissolved oxygen.

#### b. Shellfish harvest closure zones

Federal regulations administered by the Food and Drug Administration require that States establish closure zones around marinas to protect the food supply from contaminated shellfish. Good water quality is an absolute necessity in order to provide this protection. This is because shellfish are filter feeding organisms and are therefore able to concentrate pollutants. Even if

overlying waters contain low levels of pollutants, shellfish can assimilate and magnify both biological and chemical contaminants.

Construction of a marina or docking facility may result in short term localized water quality problems due to alteration of existing upland vegetation and changes in the area's watershed. However, the long term effects of marina maintenance and operations cause the greatest concern. Marina operation may contribute pathogenic organisms as well as petroleum hydrocarbons and heavy metals. The concentration of human activity in the area of a marina also poses a particular water quality concern because of the potential problem of sewage disposal.

Fecal coliform bacteria are used as an indicator of the pathogenic organisms (viruses, bacteria, and parasites) that may be present in sewage. Therefore, all water quality assessments for water-based marina designs should identify and document potential fecal coliform loadings and the shellfish closure zones that would result from those estimated loadings (see Figure 5-1).

The shellfish harvest closure zone for the proposed project should be determined based upon a water quality standard for fecal coliform of 14 organisms MPN (most probable number) per 100 milliliters of water. Once the closure zone has been determined, it should be determined if the shellfish closure zone would result in any impact to existing shellfish harvest areas. If the closure zone intersects productive shellfish areas that are approved for shellfish harvesting, development of the marina should not be allowed as planned.

#### c. Dissolved oxygen concentrations

All water quality assessments should address the potential for violations of water quality standards for dissolved oxygen concentrations. In most States' waters, a standard exists for the 24-hour average concentration and an instantaneous minimum concentration. The assessment must present reasonable estimates of these concentrations for the planned marina and adjacent waters. The estimates should be based on monitoring or modeling, depending on the nature of the marina.

The water quality assessment should be based on marina location and configuration. The first and most basic distinction made is that of open versus semi-enclosed marinas (marinas located within an embayment which effectively partitions the marina from the open ambient waters). Within the semi-enclosed marina category, further distinctions are made for existing versus proposed embayments, and whether the waters at the site are completely mixed or vertically stratified due to temperature and salinity gradients.

#### i. Tier 1 assessments: open marinas

Marinas are considered to be open if they are located along an existing shoreline and have no man-made or natural barriers which tend to restrict the exchange of water between ambient water and water within the marina area. These marinas generally consist of a number of piers or docks which extend from the shoreline (Figure 5-2). The water quality assessment for dissolved

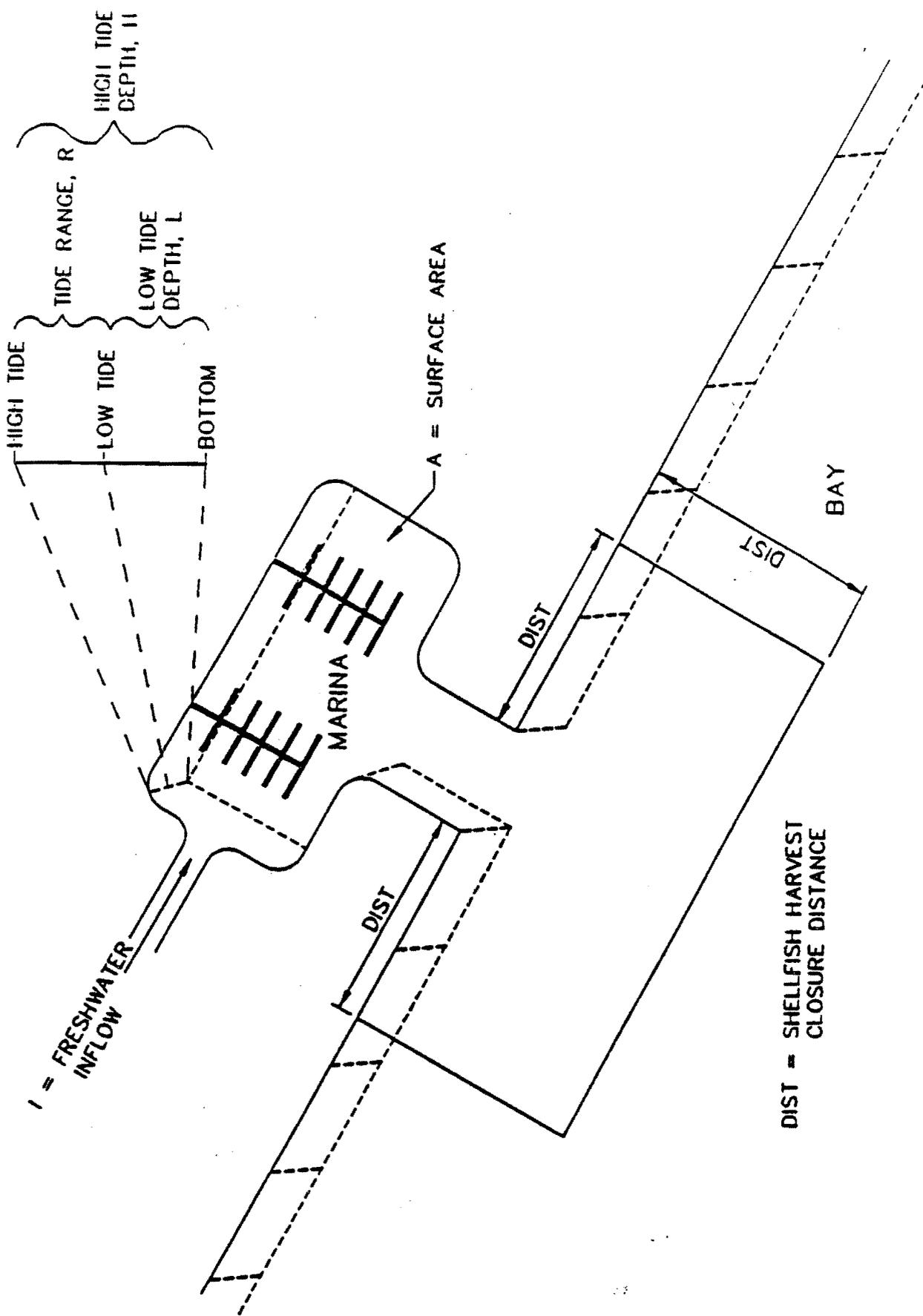
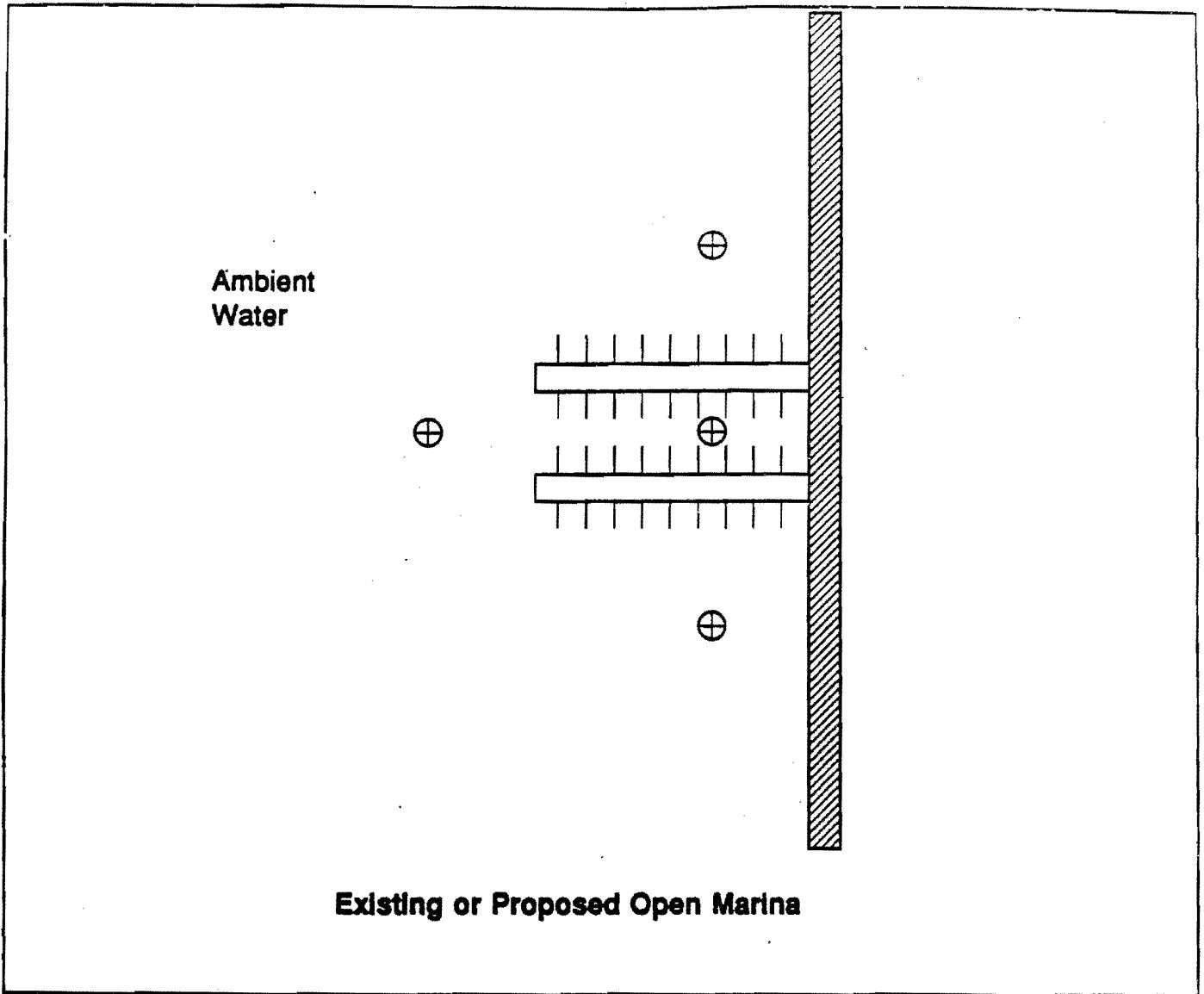


FIGURE 5-1 - REPRESENTATIVE UPLAND BASIN MARINA WITH ASSOCIATED SHELLFISH HARVEST CLOSURE ZONE



Existing or Proposed Open Marina

**KEY**



Shoreline



Potential Monitoring Sites

**Figure 5-2. Illustration of Open Marinas and Potential Monitoring Sites**

oxygen should rely on actual monitoring of dissolved oxygen concentrations within the proposed marina area. The monitoring should be representative of conditions which will be most critical in terms of meeting dissolved oxygen standards. These conditions generally occur during periods of high water temperature and low freshwater flow. In tidal areas, the monitoring should occur during average or neap tide conditions since mixing will be restricted during these periods. Occurrences of algal blooms or other conditions may influence when the critical condition occurs for a particular site.

A minimum of two days of dissolved oxygen monitoring should be collected. The monitoring should be conducted at no less than two-hour intervals and should include dissolved oxygen concentration, temperature, and salinity (if in estuarine or marine waters). The site or sites selected should be representative of the range of conditions found within the marina area. If the water column is stratified at the site, samples should be collected near the bottom, middle and surface of the water column. From the data collected, the twenty-four hour average, maximum, and minimum dissolved oxygen concentrations should be reported and compared to water quality standards to assess the potential for violations.

ii. Tier 1 assessments: semi-enclosed marinas

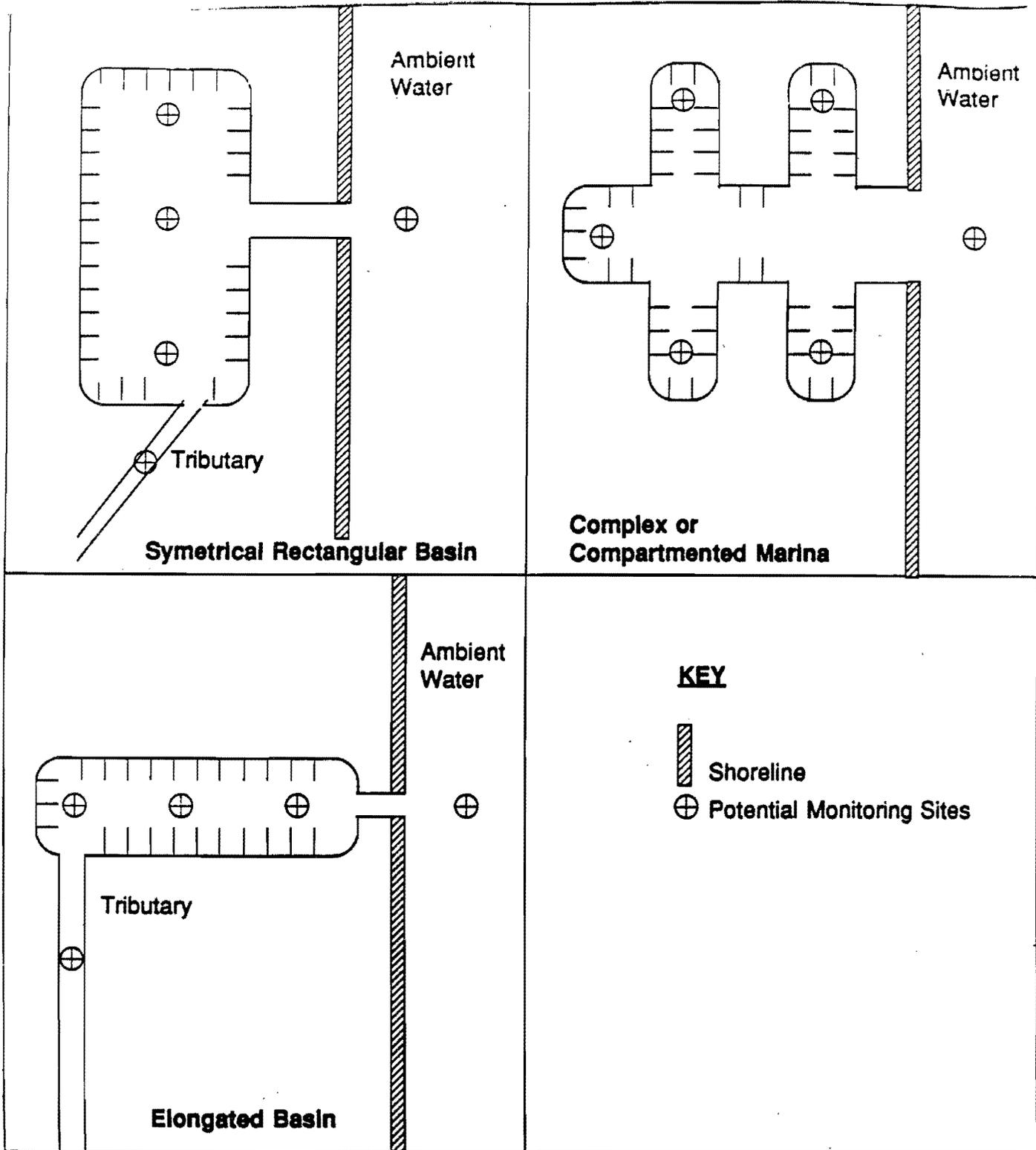
Marinas are considered to be semi-enclosed if they are located in a natural or man-made embayment which limits the mixing of waters in the marina area with ambient waters (Figure 5-3). The water quality within the embayments may differ significantly from the water quality of adjacent ambient waters. In cases like these, a combination of monitoring and modeling may be needed to estimate dissolved oxygen concentrations. If the embayment for the marina exists, the analysis may rely primarily on monitoring similar to that discussed for open marinas. If the embayment does not exist, a combination of monitoring and modeling may be necessary.

iii. Tier 1 assessments: existing embayments

For semi-enclosed marinas in which the embayment currently exists and no changes are proposed that would change the hydrodynamics of the embayment, the analysis may be limited to diel monitoring of dissolved oxygen concentrations during the critical period. The monitoring guidance provided for the open marinas applies. Modeling may be required if additional loadings of oxygen demanding substances are likely to be introduced during the operation or construction of the marina. The models discussed below in the Proposed Embayments section would be applicable.

iv. Tier 1 assessments: proposed embayments

For semi-enclosed marinas which have not yet been excavated, or for which changes have been proposed that would affect the hydrodynamics of the embayment, the water quality assessment should rely on monitoring and the application of appropriate models to predict dissolved oxygen concentrations. The dissolved oxygen screening procedures will serve as an initial assessment to determine if dissolved oxygen water quality standards are likely to be violated. If problems



**Figure 5-3 -Illustration of Enclosed Marinas and Potential Monitoring Sites**

are indicated at the screening level, more detailed procedures may be applied to examine dissolved oxygen concentrations (see Figure 5-4).

The presence of salinity, dissolved oxygen or temperature gradients that result in stratification (as discussed in the open marina monitoring section) will require detailed procedures. The screening procedures for dissolved oxygen concentrations for proposed marinas located in semi-enclosed embayments should be based on a combination of dissolved oxygen monitoring coupled with the application of a steady state, tidally averaged water quality model and a flushing model. The monitoring guidance provided in the Open Marina section, above, should serve as the basis for the screening procedure. In addition, the average tide range and high and low water depths of the adjacent ambient waters, as well as the proposed marina, should be required to implement the screening models. Flow rates (seven day, ten year low), BOD, and dissolved oxygen concentrations of tributaries that will enter the proposed basin should also be provided or monitored. Additional monitoring may be necessary in areas where there is significant algal productivity, or in cases where detailed models are applied. Typical sampling sites for enclosed marinas are illustrated in Figure 5-3.

The screening level assessment of the minimum dissolved oxygen concentration should be based on the average dissolved oxygen concentration for the proposed basin as calculated above, and on the deviation between the average and minimum dissolved oxygen concentration measured in the ambient waters.

#### v. Tier 2 assessments: detailed procedures

Detailed procedures for dissolved oxygen analyses are recommended for proposed marinas that are not expected to be completely mixed due to stratification within the water column or due to the configuration of the marina basin. For example, proposed marina basins that are significantly elongated or segmented will prevent thorough mixing and will require detailed modeling. Detailed procedures may also be necessary to evaluate potential problems indicated by the screening level analysis. The detailed procedures used will be dependent on the specific site and model being considered.

As with the screening-level analysis, the detailed analysis should include a combination of monitoring and modeling. The model selected for the detailed analysis should have demonstrated applications in predicting average and minimum dissolved oxygen concentrations for systems that are similar to the marina basin configuration being proposed. The most available and accepted model with these abilities is the WASP model, which was developed and is supported by EPA. In most situations it will be the model of choice. The monitoring required to support a detailed model will vary with the model and the specific site. Sufficient data should be collected to calibrate the hydrodynamic and water quality components of each model for the specific site.

At preapplication meeting determine whether screening level model is appropriate, or provide guidance to applicant regarding what information must be collected to make this determination.

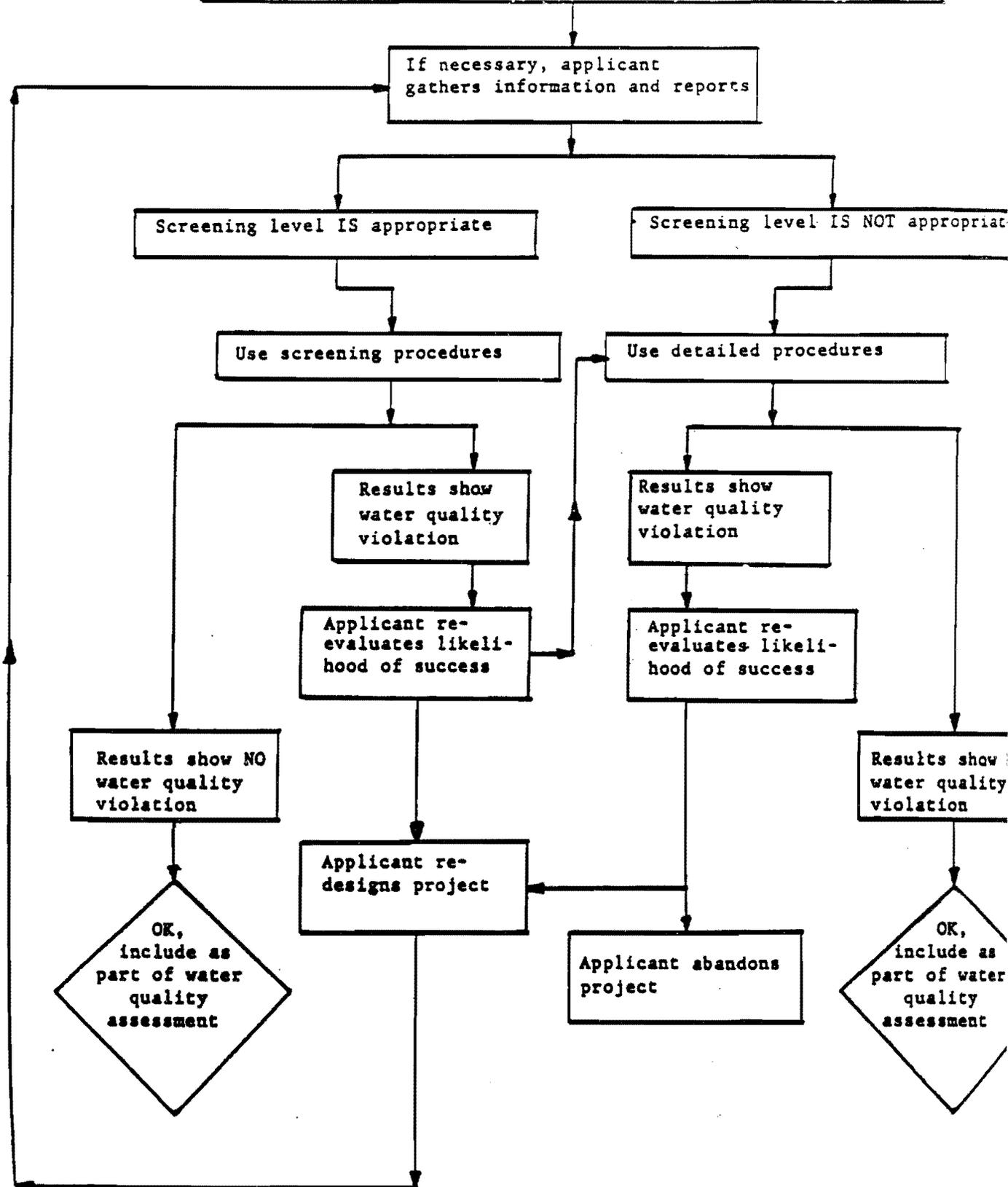


Figure 5-4, Flow Chart for Water Quality Assessments Requiring Modeling Analysis

#### d. Other parameters

Other parameters need only be investigated if there is a concern about the potential for violation of water quality standards.

### 2. Wetlands

The despoliation and destruction of public and private wetlands during marina construction and operation should be avoided. Further discussion on wetlands can be found in another chapter of this guidance.

### 3. Submerged Aquatic Vegetation

The net loss of submerged aquatic vegetation (SAV) should not be allowed. In no case should highly productive SAV be adversely impacted. If a marina is sited in the proximity of SAV, any related disturbance of these SAV areas should require compensation measures. Before such measures are approved it should be determined that substantial, prudent, and reasonable measures have been taken to avoid the impacts. Since this kind of vegetation cannot survive when heavily shaded, shading of SAV by piers crossing over them should be avoided.

### 4. Benthic Resources

The benthic community at the marina site should be evaluated using rapid bioassessment techniques (EPA, 1989; Luckenbach, Diaz and Schaffner, 1989). Benthic areas that are found to have degraded benthic communities should be considered for marina siting over those areas that are found to be healthy and productive. It is recommended that each state should develop rapid bioassessment techniques and criteria appropriate to their bioregions.

### 5. Critical Habitats

Marinas should not be sited in proximity to such areas if the project would adversely affect natural populations. A buffer zone should be established around critical habitats located near the project. The size of this zone should be decided on a case-and species-basis. No general or specific guidance regarding the extent of these buffer zones can be given because of the wide variation in requirements between species.

### 6. Dredging and Dredged Material Disposal

Ideally, marinas should be located where dredging will not be necessary to allow safe navigation. In many locations, unfortunately, this is not possible. Therefore, marinas should be sited at locations that require the least amount of dredging for the draft of the boats that will use that marina. In some cases, the draft may have to be limited to avoid or to minimize the amount of dredging. The area to be dredged should be the minimum needed for the marina itself, including the docking areas, fairways, and canals, and for other maneuvering areas that are needed. In

no case should the bottom of the marina be deeper than the adjacent open water. Marinas should not be built in sites that will require maintenance dredging more frequently than once every four years.

Previous sections of this guidebook have described natural resources which may be impacted by the construction and operation of a marina. Dredging to construct or maintain a marina can result in losses of these resources and/or adverse impacts to nearby resources because of the turbidity associated with dredging. In addition, because certain times of the year are more critical than others due to migration, spawning and early development of important species, dredging should not occur at all at such times.

During dredging operations, any project-related turbidity should be contained, thus minimizing adverse impacts to the surrounding habitat and avoiding possible violations of water quality standards. Proper placement of silt screens or turbidity curtains is a common and relatively effective method of containment. Marinas should not be built in sites that will require maintenance dredging more frequently than once every four years.

Whenever dredged material may be contaminated, disposal in an upland diked containment area is the preferred disposal method. Wherever feasible, applicants should use existing diked disposal areas. Diked disposal areas must be sized and designed to prevent resuspension or erosion of the dredged material and subsequent transport back into adjacent waters. They must also be sited to avoid ground water contamination.

Another disposal option, available only for clean, uncontaminated fill, is placement on or near shore, where it is desirable to enhance beach profiles, stabilize shorelines, and/or build or enhance wetlands.

Dredging in waters of the United States is regulated by the Army Corp of Engineers, as discussed earlier in the introduction. This guidance on dredging and dredge disposal is provided so that prospective marina owners have an indication as to what they may expect from efforts to site a marina.

## **7. Water Supply**

Marinas should be sited and designed to preclude any contamination of surface water or groundwater that is used for water supply. Runoff from potential areas of contamination, such as maintenance areas should be treated, as described under the Stormwater Management Section of this section.

Upland basins should not be excavated in areas upgradient or within 1000 feet of public or private well fields, nor should excavation occur within water supply protection areas, or where an increased threat of saline water encroachment is likely. A danger exists that dredging may improve the hydrologic "connection" between brackish water and the fresh water aquifer, which, when coupled with a head loss from pumpage within the aquifer, may result in contamination

of the aquifer. A buffer of less than 1000 feet may be used if it can be demonstrated that a lesser distance will result in no adverse impact on groundwater.

It should be demonstrated that there is an adequate water supply to serve all of their project needs. As a rule of thumb, 30 gallons/slip/day will be needed during peak usage periods.

#### **D. Pollutant Reductions and Costs**

Proper siting of marinas can completely avoid some of the NPS pollution impacts associated this type of development. Direct impacts to shellfish areas, wetlands, SAVs, and other benthic resources and habitats can be averted. Water quality problems can be greatly reduced or eliminated entirely through proper siting. The costs of identifying a good site for a marina and preparing a water quality assessment will be dependent upon regional and local conditions. Past efforts have varied from \$2,000 to \$16,000.

### **III. MANAGEMENT MEASURES FOR THE DESIGN OF MARINAS**

#### **A. Environmental Concerns**

The management measures, listed in Section B below, are designed to address the following water quality concerns.

Design considerations for the minimization of NPS pollution associated with marinas should include: shoreline stabilization, location of navigation channels, stormwater, dryboat storage, boat maintenance areas, fueling areas, and control of spills. Improper shoreline design can result in erosion or degradation of habitat. Placement and design of navigation channels is a major factor in flushing and resulting water quality. Boat maintenance activities that can result in NPS pollution include:

- Painting and paint removal,
- Welding, brazing, soldering, and metal cutting,
- Woodworking,
- Engine repair and service,
- Servicing LPG and CNG systems, and
- Boat washing and hull cleaning.

Rainfall runoff from areas where these activities occur becomes polluted with oils, greases, organic and inorganic wastes, and other potentially harmful substances. Introduction of these substances into adjacent waters can have significant adverse water quality impacts.

Marina fueling systems typically consist of storage tanks (usually underground) and pumps on shore, with fuel meters and dispensers mounted on a fuel pier or dock. Areas where boats are fueled are subject to contamination from petroleum hydrocarbons from leaks and spills.

## **B. Management Measures**

This section contains the management measures to be applied in the design of marinas:

- (1) Use natural vegetation to stabilize shorelines wherever possible.
- (2) Navigation and access channels should be located in areas with safe and convenient access to waters of navigable depth, based on the kind of vessel expected to use the marina, but in no case exceeding the depth of adjoining channels and waters.
- (3) The first one-half inch of runoff from the entire marina property for a 10-year 24-hour storm should be detained and released over a 24-hour period.
- (4) All stormwater management systems should be provided with a bypass or overflow system so that the peak discharge from a 10-year 24-hour storm will be safely conveyed to an erosion and scour-protected storm water outfall.
- (5) Dry boat storage should be utilized over wet slips wherever feasible.
- (6) Boat maintenance areas should be designed so that all maintenance activities that are significant potential sources of pollution can be accomplished over dry land and under roofs (where practical), allowing for proper control of by-products, debris, residues, solvents, spills, and stormwater runoff. All drains from maintenance areas should lead to a sump, holding tank, or pumpout facility from which the wastes can later be extracted for treatment and/or disposal. Drainage of maintenance areas directly into surface or ground water or wetlands should not be allowed.
- (7) Fueling stations generally should be located such that they are accessible by boat without entering or passing through the main berthing areas in order to avoid collisions.
- (8) Marina operators should have a spill contingency plan and the proper equipment and training to implement the plan.

## **C. Marina Design Practices**

This section provides technical guidance on practices that may be used as tools to assist in the implementation of the management measures set forth in Section IV.B. above.

## **1. Shoreline Protection and Basin Design**

Natural vegetation should be used wherever feasible to stabilize shorelines. However, when additional stabilization becomes necessary, sloping riprap revetments are preferred over vertical bulkheads, since they generally provide greater habitat and reduce wave reflections. Shoreline intertidal areas should be preserved to the greatest extent possible.

In instances where bulkheads are to be installed, they should be constructed in such a manner that they are effective against erosion and provide adequate bank stabilization. The potential for erosion and scour at the mudline should be evaluated. Bulkheads should be constructed to prevent losses of fine material through joints or cracks from the land side to the water side, which could ultimately lead to failure of the wall. Bulkheads should be stabilized by providing adequate anchorage (such as batter piles or tie backs) or adequate embedment, depending on the type of bulkhead. Where public walkways, steps, or ramps run adjacent to bulkheads, handrails or other safety provisions should be provided along the top of the wall where the vertical drop to the current mean low water line or mud line exceeds three feet, unless local or State building codes stipulate otherwise. Any interference with public access should be avoided.

Basins that are constructed with square corners or other stagnant water areas will tend to trap sediment and debris. If this debris is allowed to collect and settle to the bottom, an oxygen demand will be imposed on the water and water quality will suffer. Therefore, square corners should be avoided in critical down-wind or similar areas where this is most likely to be a problem. If square corners are unavoidable because of other considerations, then points of access should be provided in those corners to allow for easy clean out of accumulated debris.

Riprap revetments are considered to be flexible since they can accommodate minor consolidation and settlement of their foundations. Still, adequate provisions should be made to prevent migration and loss of fine materials through the riprap, such as placement of a filter fabric beneath the armor layer. The slope of the revetment should be sufficiently flat to maintain stability, but in no case should the slope be steeper than one vertical to 1.5 horizontal. In addition, adequate toe protection should be provided to compensate for known or anticipated scour.

Considerations for new construction are addressed in the urban section of this document. Control measures such as turbidity curtains, vegetative barriers, etc. should be used to contain erosion.

## **2. Navigation and Access Channels**

Channels should be located in areas with safe and convenient access to waters of navigable depth, based on the kind of vessels expected to use the marina, but in no case exceeding the depths of adjoining channels and waters. "Safe and convenient" access should be determined on a case-by-case basis, taking into account such factors as existing water depths, distance to existing canals and their depths, and tidal and wave actions. Before considering dredging,

should attempt to gain access to deeper water by extending docks and piers farther from shore. The maximum extent to which a pier should extend into the waterway should be determined by each state and applied in a consistent manner (10% of the width of the channel has been set in some cases). In some cases, rather than dredging (and possibly having to develop a compensation plan), it may make more sense to simply limit the maximum boat drafts in the marina or utilize dingy access to moorings. Where channels are narrow, dry stacking of boats should be considered.

Where dredging is unavoidable, natural or existing channels should be used to minimize the amount of dredging. Also, naturally existing channels are less likely than surrounding shallow areas to contain shellfish beds, submerged aquatic vegetation, or other resources which may complicate permitting and require mitigation or compensation measures.

### 3. Wastewater Facilities

Three types of onshore collection systems are available: marina-wide systems, portable/mobile systems, and dedicated slipside systems. Marina-wide collection systems include one or more centrally located sewage pumpout stations. These stations are generally located at the end of a pier, often on a fueling pier so that fueling and pumpout operations can be combined. Boats requiring pumpout services dock at the pump-out station, a flexible hose is connected to the wastewater fitting in the hull of the boat, and pumps or a vacuum system move the wastewater to an on-shore holding tank, a public sewer system, a private treatment facility, or other approved disposal facility. In cases where the boats in the marina use only small portable (removable) toilets, a satisfactory disposal facility could be a toilet into which the portable (removable) toilets can be dumped. Portable/mobile systems are similar to marina-wide systems except that the pumpout stations are mobile. The mobile unit includes a pump and a small storage tank. The unit is connected to the deck fitting on the vessel, and wastewater is pumped from the vessel's holding tank to the pumping unit's storage tank. When the storage tank is full, its contents are discharged into one of the previously listed approved disposal facilities. Dedicated slipside systems provide continuous wastewater collection at a slip. Slipside pumpout should be provided to live-aboard vessels. The remainder of the marina can still be served by either marina-wide or mobile pumpout systems.

Note that chemicals from holding tanks may retard the normal functioning of septic systems. Neither the chemicals nor the concentration of wastes has proven to be a significant problem for properly operating public treatment plants provided there is adequate dilution between the marina and the treatment plant. In some cases, the effluent from the marina may have to be diluted before introducing it to the sewer system.

Shoreside restroom facilities for the use of marina patrons should be required at all marinas. Adequate restroom facilities for any given marina are dependent upon the nature (recreational or public, or residential or planned community) and size of the marina and its ancillary features. Restroom facilities should be conveniently located and well-maintained to encourage their use by boaters at the marina. At residential or planned community marinas public restrooms may

not be required unless there are non-residents who routinely use the marina who do not have access to a private bathroom, or unless the convenient travel time from the slips to the residences is longer than five minutes.

Marina operators should post ample signs prohibiting the discharge of sanitary wastewater, dishwater, or greywater from boats into the waters of the State, including the marina basin, and also explaining the availability of pumpout services and public restroom facilities. Signs should also fully explain the procedures and rules governing the use of the pumpout facilities.

#### **4. Stormwater Management**

All stormwater management systems should be provided with a bypass or overflow system so that the peak discharge from a 10-year 24-hour storm will be safely conveyed to an erosion and scour-protected storm water outfall. All discharges shall be calculated using methods developed by the U.S. Soil Conservation Service and described in either their Technical Release 20 or 55.

For new construction:

- (1) The first one-half inch of runoff from the entire marina property for a 10-year 24-hour storm should be detained and released over a 24-hour period. Runoff should be controlled with a weir that will direct the first one-half inch of runoff to the are and bypass the rest to the receiving water body. This is known as control of the first flush and is important because this first one-half inch of runoff has high concentrations of pollutants compared with the bulk of the remaining runoff.
- (2) Use of infiltration practices may also be an acceptable alternative. Paving materials which allow for increased infiltration include permeable asphalt paving, paving blocks, and, in lighter use areas, coquina, gravel, oyster shells, or similar surfaces. Such infiltration practices are acceptable only in areas with appropriate soils, slopes, and depths to ground water. A strict maintenance schedule should be prepared and adhered to by the marinas operator. Porous asphalt should be used only as a last resort and only after a regular vacuuming schedule has been approved. This is needed because porous pavements can quickly become impermeable when clogged with small quantities of fines. Once they have become impermeable, their storm runoff benefits are nullified.
- (3) Other treatment practices for storm runoff may be considered on a case-by- case basis if they can achieve an equivalent removal efficiency of 80% of suspended solids in addition to removal of other pollutants as needed.

## **5. Dry Boat Storage**

Dry boat storage is the storage of boats on dry land (inside or outside) when they are not in use, often in multi-level vertical racks using a forklift truck or crane system. Dry storage of boats drastically reduces the in-water requirements for structures, typically requiring only a few wet staging slips for short term berthing of vessels after being taken from storage for subsequent boarding, and then upon their return before being placed back into storage. Dry storage should be utilized over wet slips wherever feasible due to the reduced potential for adverse environmental impacts from NPS pollution.

Construction of dry storage buildings must conform to all applicable requirements of municipal, county, or State housing, electrical, plumbing, fire protection, and building codes. In the absence of any such fire protection codes, fire protection procedures for dry storage areas are covered in the National Fire Protection Association (NFPA) 303, Fire Protection Standard for Marinas and Boatyards.

## **6. Boat Maintenance Areas**

Boat scraping, sanding, washing, etc. should only be done in areas designed to handle runoff in a manner that prevents it from reaching adjacent waters and wetlands (see sections on stormwater and operations and maintenance).

## **7. Fuel Storage and Delivery Facilities**

In the event of a spill of fuel, oil, or other toxic or hazardous substance, it is the responsibility of the marina operator to properly contain and clean up the spill in a timely and diligent manner. This is true even if the spill has been caused by some negligent or inadvertent action of a patron of the marina. Coast Guard regulations require that all spills that cause a visible sheen on the water must be reported. All spills should also be reported immediately to the proper state authority. A spill contingency plan should be posted and include:

- (1) Posting of notification procedures in the event of a spill.
- (2) Immediate on-site availability (less than 1/4 hour) of containment equipment such as booms, absorbent materials, or skimmers. This equipment should be conveniently stored on site. Responsible marina personnel should be trained in the proper use of this equipment. Marina personnel should be required to participate in annual drills to demonstrate their readiness in the event of a spill and to assure that containment equipment is in working order.
- (3) Disposal of the collected fuel or other material contaminated by the pollutant in accordance with applicable State and Federal regulations.

## 8. Piers and Dock Systems

All timber used for construction above the water line should be pressure treated with a preservative such as chromated copper arsenate (CCA) or creosote to avoid damage by wood borers. Underwater, or periodically submerged portions of timber structures should not be constructed with CCA or creosote-treated timber. Treated piles that project above deck level should be protected with battens or some protective sheathing.

The use of concrete pilings should be seriously considered both in planned marinas and those undergoing expansion or repair/replacement of piers. Use of concrete pilings eliminates leaching of preservatives and decreases pier maintenance costs.

### D. Pollutant Reductions and Costs

Actual numbers on pollutant reductions and costs are not currently available. The following discussion is on the relative pollution reduction of the management measures.

The proper design of marina channels and basins will result in avoidance of impacts to important habitat and protection of water quality. Properly flushed channels and basins will prevent build-up of natural and man induced substances that degrade the environment. Pollutant reductions and cost for the control of stormwater are discussed in the chapter of this guidance on urban management measures.

With dryboat storage, dredging is minimized since there is no large basin, only a small staging area. This will minimize water quality and flushing concerns, as well as flow disruptions caused by structures built to protect boats from wind and wave action. Large amounts of treated timber for docks and bulkheads are not needed, thus minimizing the leaching of wood preservatives into the water and the shading effects of docks, piers, pilings, and boats. The amount of contact time between pesticide-containing bottom paints and the water is minimized, perhaps even eliminating the need for the use of bottom paints. The use of construction material that does not contain CAA or creosote may not add to initial construction costs (unless concrete is used), but may add maintenance costs due to upkeep (unless concrete is used).

Proper design of fueling facilities and repositioning of spill containment and cleanup equipment (100 feet of boom and absorbent material) will add approximately \$2000 to \$10,000 in cost to a marina project. Pollutant reduction is difficult to quantify because of the episodic nature of fuel spillage.

#### **IV. MANAGEMENT MEASURES FOR OPERATIONS AND MAINTENANCE OF MARINAS AND BOATS**

##### **A. Environmental Concerns**

The Management Measures, listed in Section B below, are designed to address the following water quality concerns.

The operation and maintenance of a marina and associated boating produces the same concerns as those addressed in the design of marinas as well as day-to-day activities such as disposal of fish wastes and the repair, maintenance, and operation of boats.

During the summer months, dissolved oxygen depressions, odor complaints and aesthetic problems may result from disposal of fish wastes into the water in concentrations that overload the natural ecosystem.

Small boat yards and marinas are confronted with handling a significant number of hazardous waste sources due to the variety of maintenance and repair operations that result from boat operations. Owners of marinas have a responsibility to see that no hazardous materials enter the body of water on which they are located.

Many of the wastes generated by boat yards and marinas must not be discharged into either sanitary sewers, storms or deck drains. Although there are some exceptions, most inside drains go to sanitary sewers and most outside drains go to natural waters. Wastes improperly disposed down drains may cause water pollution, damage or impair sewage treatment plants and can be harmful to workers. Contaminants of concern include, antifreeze, oils, detergents, wash water from cleaning floors and decks and paint dust.

##### **B. Management Measures**

This section contains the management measures to be applied in the operation and maintenance of marinas and boats:

- (1) Encourage the recycling of fish wastes back into the natural ecosystem in a manner that will not degrade water quality or cause other adverse environmental impacts.
- (2) Tarps and vacuums should be used to collect solid wastes produced by cleaning and repair of boats. Such wastes should be prevented from entering adjacent water.
- (3) Vacuum or sweep up and catch debris, sandings, and trash from boat maintenance areas on a regular basis so that runoff will not carry it into the water.

- (4) An oil water separator should be used on outside drains and maintained to ensure performance.
- (5) Curbs, berms or other barriers should be built or placed around areas used for the storage of liquid hazardous materials to contain spills.
- (6) Tarps should be used to catch spills of paints, solvents, or other liquid materials used in the repair or maintenance of boats.
- (7) Used antifreeze should be stored in a barrel labeled "Waste Antifreeze Only" and should be recycled.
- (8) Valves should be used on the air vents of fuel tanks that prevent fuel from overflowing and spilling.
- (9) All boats with inboard engines should have oil absorption pads in bilge areas and they be changed when they are no longer useful or at least once a year.
- (10) Only phosphate-free and biodegradable detergents should be used for boat washing.

### **C. Marina Operation and Maintenance Practices**

This section provides technical guidance on practices that may be used as tools to assist in the implementation of the Management Measures set forth in Section V.B. above.

#### **1. Fish Wastes**

A fish waste policy may need to be developed. In order to implement the policy in a consistent manner, guidelines could be established that meet the following requirements:

- (1) Fish wastes should not be discharged into surface waters in any dead end lagoons, other poorly flushed locations, or other areas where such discharge could result in a water quality or public nuisance problem.
- (2) Where fish waste disposal will not result in water quality or public nuisance problems, fish wastes could be recycled back into the ecosystem from which the organisms were originally harvested.
- (3) Fish waste recycling within marina basins should only be allowed if in accordance with approved Operations and Maintenance Plans. Marinas should not provide fish cleaning stations unless the activity has been included in the Operations and Maintenance Plans. Marinas which are not approved for fish waste recycling

should post signs warning fishermen that fish wastes should not be disposed of in the water at that location.

- (4) Fish wastes should not be recycled into surface waters in such a way that they will wash up onto any shoreline, or cause odors or other nuisances.

## **2. Boat Maintenance Areas**

Small boat yards and marinas are confronted with handling a significant number of hazardous waste sources due to the variety of maintenance and repair operations that result from boat operations.

### **a. Hydroblast containment**

This practice entails the containment of hydroblast (pressure washing) wastewater to prevent paint chips and oil from being discharged into natural waters and storm drains. In most states, permission must be obtained to discharge these wastes to the local sanitary sewer. The local utilities should be consulted for pretreatment possibilities. Cleaning processes that use chemical additives such as solvents or degreasers must be done in a self-contained system that prevents discharge to storm drains or sanitary sewer. Wastewater without such additives should be directed into wetpond detention basins as described in another section of this guidance. Where feasible, wastewater from this operation can be collected and reused.

### **b. Abrasive blasting containment**

Grit from abrasive blasting contains paint chips and other materials should be prevented from entering natural waters or storms. 'Dockside' blasting, outside a drydock or containment area should not be done. Workshops and yards must be kept clean of debris and grit from sand blasting operations so that runoff and wind will not carry any waste into the water. During blasting operations, outdoor areas should be enclosed in plastic tarps and no blasting should be done on windy days. The bottom edge of tarpaulins and plastic sheeting must be weighted so that it will remain in place during light breezes. A spray booth should be used whenever possible to capture the blast grit and should be used if sand is being used.

### **c. Spray booths**

Spray Booths concentrate paints and as such represent a hazard to both employees and the environment. Booths must meet local building and fire code requirements and must ensure adequate ventilation for people working in them. Paint guns used in spray booths should be either High Velocity Low Pressure (HVLV) or High Efficiency Low Pressure (HELP) which are rated at 65% efficient paint transfer, or electrostatic paint spraying methods. In replacing existing spray guns, convert to HVLV or HELP types. Cleaning paint guns can also be hazardous since spent solvent must be treated as a hazardous waste and not discharged directly into drains. *Cleaning should be done in an enclosed gun cleaner/recycler machine.*

#### d. Waste storage

Waste oil, fuels stored above ground and hazardous material must be protected by a berm (a built-in curb or barrier) in an area that is sufficiently large to contain a spill. Its purpose is to catch anything that spills or leaks, in case a container is tipped, overfilled or ruptured. No drains should be inside the secondary containment. If for some reason there is a drain, it should lead to a blind sump. Secondary containment should have a concrete floor and, if outdoors, be roofed. Other measures that count as secondary containment that may be used instead are;

- (1) A sump, with no drain, near the tank to catch an accidental spill,
- (2) Build a 2 to 4 inch sill across the doorway, high enough to contain a spill yet low enough to allow machinery to access the building,
- (3) Buy or build double-containment tanks, and
- (4) Or build high drip pans installed under existing tanks.

Outdoor storage of hazardous materials (drums, smaller container, batteries) must be covered and have secondary containment. Containers of hazardous materials should be placed under cover and on impervious pads (concrete is not impervious unless the surface is properly coated). Secondary containment may be a berm or a pallet with a tray. All drums must be labelled with the date, the words "Hazardous Waste", the associated hazards (ie, flammable) and the contents of the container.

#### e. Waste oil storage

Waste oil should not be contaminated with any other hazardous substances and if it does become contaminated, it should be labelled as a hazardous waste which entails expensive disposal procedures. Drums should be labelled "Waste Oil Only" to prevent mixing in other wastes, especially solvents. The labelling also aids fire fighters who, in case of fire, must treat an unlabeled drum as the worst case. Waste oil should be disposed of according to appropriate statutes and regulations. Recycling is strongly encouraged.

#### f. Drainage systems

Most local sewer utilities, via pretreatment ordinances and discharge permits, restrict what can be poured into inside drains since some contaminants are not removed by the treatment process. Drains connected to sanitary sewers may need sand traps and oil water separators. Lack of an oil-water separator for steam cleaning and pressure washing of engines and other oily parts may result in a violation of discharge limits. However, an oil-water separator is designed for the specific purpose of removing oil from water and will not remove all hazardous waste. Oil-water separators should be regularly maintained and cleaned whenever three inches of oil has accumulated. Local sewer utilities should be contacted for help in determining the best way to

dispose of liquid wastes since discharge limits vary. Great care must be taken not to allow any contaminants to enter outside drains since most drain directly in streams or rivers without any type of treatment. Oil water separators should be installed on outdoor drains in areas where engine maintenance occurs.

g. Liquid waste management

Paints and solvents must be prevented from entering waterways by the use of drip pans, drop cloths or tarpaulins. Whenever possible, paints and solvents should be mixed in bermed areas away from storm drains, surface waters, shorelines and piers. Only one gallon (or less) of paint and solvent should be opened at a time when working on floats and should be contained within drip pans or tarpaulins. Paint and solvent spills should be prevented from reaching storm or deck drains, cleaned up and disposed of appropriately. Cleanup materials soaked with solvent must be handled as hazardous waste.

h. Solid waste management

Cleaning must be done in such a way that no debris falls into the water and is done to prevent the accumulation of waste material that may get blown onto surface waters. Cleaning with a vacuum is the preferred method for collecting sandings and trash. Sandblasting debris should be collected and stored with the spent grit and removed frequently. Hosing of decks and docks should not be done when it might cause debris to be washed into the drains. After the contents of a drum or a container is used they should be flattened and made unusable. If possible, reuse or recycle empty drums rather than dispose as solid waste.

Marina operators are responsible for the contents of their dumpsters and hazardous waste should never be placed in them. Dumpsters should be locked within an enclosure to prevent "midnight dumping". Liquid wastes should not be placed in dumpsters but disposed of properly by other methods. Recycling of non-hazardous solid waste such as scrap metal, aluminum, glass wood pallets, papers and cardboard is recommended wherever feasible. Dumpsters, that store items such as used oil filters should, while awaiting transfer to a landfill, be covered to prevent rain from leaching material from the dumpster onto the ground.

i. Antifreeze

Antifreeze from boat engines may be recycled if it is not mixed with other wastes. Some facilities elect to purchase on-site recycling equipment. However, filters from the recycling units must be handled as hazardous waste and may not be disposed of in solid waste. Runoff that contains antifreeze should be prevented from entering storm drains or natural waters.

#### j. Boating

Discharges from boats are subject to regulation under the Clean Water Act. However, many activities associated with the use of boats result in impact to coastal waters. Activities that may mitigate some of the impacts associated with boating include:

- (1) Prohibitions on the use of environmentally damaging materials and encouragement of environmentally sensitive substitutes,
- (2) Speed zones where erosion or other detrimental results could occur,
- (3) No boating and/or anchorage zones where sensitive or critical habitats could be damaged by "prop-wash",
- (4) No discharge zones where water quality standards could be violated by such a discharge,
- (5) Limitations on in-the-water boat hull cleaning if it can be demonstrated that this is a significant local problem,
- (6) If in-the-water boat hull cleaning can be an acceptable practice if it is done with a soft cloth (instead of scraping) several times a year, and
- (7) Prohibitions of disposal of wastes from boats into State waters.

#### D. Pollutant Reduction and Costs

Pollutant reduction and costs have not been determined for the Management Measures related to the operation and maintenance of marinas and boats. NPS pollution resulting from some of the activities identified above can be eliminated entirely and others can be greatly reduced through implementation of the prescribed Management Measures.

#### V. **RECOMMENDATIONS FOR STATE PROGRAMS TO IMPLEMENT MANAGEMENT MEASURES FOR MARINAS AND RECREATIONAL BOATING**

The information in the remainder of this chapter does not represent management measures but are recommendations for States to consider in their overall approach to marina and recreational boating NPS pollution management. The draft program guidance to be published by EPA and NOAA in the summer of 1991 will contain information on State Coastal Nonpoint Pollution Control Program development and approval.

## **A. Management Process**

It is recommended that a process be developed by every State to permit and regulate recreational boating and marina development and operation. This process should be the foundation on which the actual management measures identified in the rest of this chapter can be designated and implemented. Most States already have programs designed to accomplish many of the actions suggested in this guidance and States are not encouraged or discouraged from reorganizing their programs as described in this chapter. However, it is recommended that States review and, if needed, revise their programs to meet the performance goals identified. Marina and boating programs should consist of the following:

- (1) Marina regulations,
- (2) Marina development application form,
- (3) Technical guidance for locating, planning, design and construction of marinas,
- (4) Boating regulations,
- (5) Chemical bans/controls of certain boat washing or stripping chemicals,
- (6) Enforcement/ monitoring plans, and
- (7) Public education.

Marina regulations should deal with potential pollution sources that may originate due to the physical presence or operation of marinas. The intent of the regulations should be three-fold. First, to apply strict environmental controls over the siting, design, construction, and operation of new marinas. The controls should be most comprehensive for new marinas because new construction offers the greatest opportunity for proper environmental planning and management. Second, to allow upgrading of existing facilities in ways which can benefit the environment by imposing reasonable restrictions which would effectively discourage or prevent environmentally detrimental impacts. In this case, it is recognized that physical constraints at existing sites may present insurmountable limitations over the scope of feasible improvements that can occur. Third, to provide for safe and environmentally sound operation of existing and future marinas through prevention of pollution by good housekeeping procedures.

## **B. Public Education**

To improve success in reducing NPS pollution from marinas and recreational boating, a public education program is vital. The public should be educated about causes of NPS pollution and practices that will reduce NPS pollution. Specific areas in which boaters should be educated include:

- (1) The types and sources of NPS pollution impacts associated with marinas and boats,
- (2) Locations and types of sensitive coastal resources and wildlife habitat areas in local waters, and methods of minimizing boater impacts,
- (3) New environmental protection initiatives and new operational measures implemented to respond to these initiatives,
- (4) Marina operation and maintenance plans,
- (5) Encourage limited use of detergents or use of detergents with 0.5% phosphates by weight,
- (6) Proper collection and disposal of hazardous material (bottom paint scrapings and sanding dust, fiberglass resins, epoxy, MSD pumpout waste, dump station wastes, acid-type cleaners, wood bleaches, varnishes, etc.),
- (7) Environmentally sensitive boat maintenance and upkeep procedures,
- (8) Inform the public as to EPA and Coast Guard regulations prohibiting the discharge of oil or oily waste that causes a visible film or sheen,
- (9) Proper use of sewage pumpout facilities, and
- (10) Other boating regulations.

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APPENDIX 19

WATERFRONT PUBLIC ACCESS SITES

# **A WATERSHED MANAGEMENT PLAN FOR BARNEGAT BAY**

## **PRELIMINARY LIST OF EXISTING PUBLIC ACCESS SITES**

### **FEDERAL**

Edwin B. Forsyth National Wildlife Refuge  
Proposed Expansion - Reedy Creek

### **STATE**

Island Beach State Park  
Island Beach Research Area and Wildlife Sanctuary  
Island Beach Northern Natural Area  
Barnegat State Park  
Double Trouble State Park  
Manahawkin Natural Area, Stafford Township  
Swan Point Natural Area, Brick Township  
Manahawkin Wildlife Management Area  
Stafford Forge Wildlife Management Area  
Whiting Wildlife Management Area  
Forked River State Marina

### **OCEAN COUNTY**

Bridge Avenue County Park, Point Pleasant Borough  
Metedeconk River County Recreational Area, Lakewood/Brick  
Cattus Island County Park, Dover  
Riverfront Landing County Park, Dover  
Mill Creek County Park, Berkeley  
Berkeley Island County Park, Berkeley  
Forge Pond County Golf Course, Brick Township  
Gull Island County Conservation Area, Point Pleasant Beach  
Shenandoah County Field Sports Complex, Lakewood  
Ocean County Park, Lakewood  
Bowman Road Field Sports Complex, Jackson  
Robert J. Miller Airpark, Berkeley  
Wells Mill County Park, Ocean Township  
A. Paul King County Park, Eagleswood

### **MUNICIPAL BAY BATHING BEACHES & WATERFRONT RECREATIONAL AREAS\***

Beachwood Beach, Compass & Beachwood, Borough of Beachwood  
Slade Dale Park, Dorsett Dock Rd, Point Pleasant  
Bay Harbor Beach, Bay Way Ave., Brick Township  
Windward Beach, Princeton Ave., Brick Township  
Forge Pond Park, Chambers Bridge Rd., Brick Township  
Island Beach, Gladney & Rivera, Dover Township  
Money Island, Longfellow Ave., Dover Township  
Shelter Cove, Bay Ave., Dover Township

Central Ave. Beach, Island Heights  
Summit Ave. Beach, Island Heights  
Brown Tract, Washington St. along Toms River, Dover Township  
Lavallette Beach, Bay Blvd., Lavallette  
Ocean Gate Angelsea Beach, Ocean Gate  
Ocean Gate Wildwood Beach, Ocean Gate  
Pine Beach East, Station Rd., Pine Beach  
Pine Beach West, Avon Rd., Pine Beach  
Hancock Ave. Beach, Seaside Heights  
Lincoln Ave. Beach, Seaside Heights  
Sunset Cove Park, Berkeley Lane & L St., Seaside Park  
Seaside Park Bay & 5th Ave., Seaside Park  
Bayview Fishing Pier, 13 & 14th St., Seaside Park  
Mill Creek Park, Stafford Township  
Jennifer Lane Beach, Manahawkin  
Waretown Fishing Station, Bryant Road, Ocean Township  
Barnegat Bay Beach, Bay Shore Drive, Barnegat  
Harvey Cedars Bay Beach, Long Beach Blvd., Harvey Cedars  
Waterfront Recreation Area, Salem Ave., Harvey Cedars  
Bayfront Park, Beach Haven  
Waterfront Park, Shore Ave., Ship Bottom

\*(not an all inclusive list - does not include private beach associations and "commonly" used sites providing waterway recreational access surrounding the Bay)

#### **PUBLIC (MUNICIPAL) BOAT LAUNCHING SITES**

Point Pleasant Municipal Boat Ramp, Foot of Bay Avenue  
Lavallette Municipal Boat Ramps, Bay Blvd.  
Seaside Heights Municipal Boat Ramp, Bayview Avenue  
Seaside Park Municipal Boat Ramp, Bayview Ave & 13th St  
Toms River Municipal Boat Ramp, Riverside Drive  
Island Heights Municipal Boat Ramp, Lake Drive  
Toms River Municipal Boat Ramp, Garfinkle Park  
Barnegat Light Municipal Boat Ramp, Bayview & 10th St  
Surf City Municipal Boat Ramp, Division St & Bay Ave  
Ship Bottom Municipal Boat Ramp, Foot of 10th St  
Barnegat Municipal Boat Ramp, Barnegat

APPENDIX 20  
POTENTIAL PUBLIC ACCESS SITES

## POTENTIAL PUBLIC ACCESS LOCATIONS - BARNEGAT BAY

(Compiled by the Citizen's Public Access Subcommittee)

- (1) BoatRamp - Marine Police Station, Point Pleasant
  - partially bulkheaded area just to the South
- (2) Fishing Pier - East side of Point Pleasant Canal
  - south of Bocan Construction
- (3) Fishing Pier - Mantoloking Bridge, Route 528
  - using part of old bridge structure for parking
  - build lower catwalk for fishing & crabbing
- (4) Trails/Boat Ramp - Semi-dredged lagoon North of Traders Cove Marina (proposed National Wildlife Refuge)
- (5) Trails/Boat Ramp - Semi-dredged Lagoon West of Sloop Point (proposed National Wildlife Refuge)
- (6) Pier/Boat Ramp - Green Island
  - Abandoned Marina Site (private)
- (7) Boat Ramp/Pier/Beach - Cattus Island Park
  - former Jackson Estate
  - cleared land front of house
- (8) Fishing Pier - Route 37 Bridge (East end main span)
  - crabbing along bulkhead
  - build fishing access catwalk
- (9) Boat Ramp/Fishing Pier - Toms River, Route 166
  - across from Toms River Boat Works
  - empty parcel bulkheaded land
- (10) Boat Ramp/Fishing Pier - Brick Town on Bay (South side of Rt 35)
  - Southeast of Dutchman's Point
  - Bulkheaded property owned by Brick
  - Near Jet Ski Rental
- (11) Recreational Waterfront Facility - Metedeconk Bathing Beach
  - abandoned property
  - privately owned

APPENDIX 21

FUNDING SOURCES FOR PUBLIC ACCESS PROGRAMS

## FUNDING SOURCES FOR PUBLIC ACCESS PROGRAMS

### LEGAL TECHNIQUES

\* **Fee Simple Acquisition** means the purchaser acquires all the legal rights of property. A public entity may acquire ownership in fee simple by purchasing the land from a willing seller or through eminent domain. In either case, the public must pay fair market value for the land. Fee simple ownership may also be obtained through dedication of land, at no cost to the public, or at a reduced price. A seller may choose to offer land in one of these two ways, to either a public entity or a non profit organization, in exchange for other benefits, such as tax credits.

\* **Property Easements** secure a limited legal right to utilize some aspects of a piece of land. While fee simple confers all of a parcels legal property rights, an easement affords it owner the right to enjoy one element of the property, such as the right to walk across it. Easements may be acquired through the same means as those used in fee simple acquisition. An easement may be obtained through eminent domain, an agreed purchase or through dedication.

A particular type of dedication is known as a conservation easement. A property owner may offer an easement on his/her land to a public or non-profit entity in exchange for the assurance that the land will only be utilized in a specific manner, such as for conservation purposes. The conservation easement may be for the entire parcel of land or for a portion of it. In either case, flexibility to use the land is limited to specific terms. If those terms specify that the land is to be utilized for public access or public recreation, this type of easement could be valuable as fee simple ownership. Easements run with the land and may be put in place in perpetuity. Acquisition of an easement is generally less expansive than fee simple and may be very effective in securing public access.

\* **Long term leases** transfer the legal property rights from the original owner to the purchaser for a specified period of time. The leaseholder may then use the land however he/she chooses, but only for the term of the lease. Long term leases are generally less expensive than perpetual easements and may be used to establish accessways for immediate use. Leases may also provide a short term public access solution while a long term method is being developed.

### FINANCIAL TECHNIQUES

\* **General Obligation Bonds** are a traditional source of revenue used by municipalities to develop parks, schools and other government facilities. Bonds are instruments by which the government borrows money from investors and pays the principal and interest over a number of years, similar to a loan. Through this method, the taxing power of the jurisdiction is pledged to pay interest and principal to retire the debt of the bond.

\* State and Federal Funding Programs provide funds for the acquisition and development of recreational lands. These programs include:

**State Green Acres Program** oversees the Green Trust which makes low interest loans and grants available to counties and municipalities for the acquisition or development of open space for public recreation. Funding decisions are based on greatest open space need, greater facilities need and natural resources conservation. Any municipality or county which enters into a contract with Green Acres is required to provide public access to the lands developed or acquired with these public funds and retain all of these lands held for these purposes.

The **Open Lands Management Program** is administered under the Office of Natural Lands Management, Division of Parks and Forestry. This program enables private property owners to make their land available to the public for outdoor activities, while receiving funds from the State to develop and maintain the property. The money is to be used to facilitate outdoor recreation and eliminate potential problems and hazards for the property owner.

**NJ Coastal Management Program**, in the past, offered a pass-through grant program to local governments for waterfront planning purposes. The grants, which may be reinstated in the future years, provide local governments with 100% funding to plan projects which further the objectives of NJ's Coastal Management Program, including water dependent projects, community open space needs, public access opportunities, and natural resources protection.

The **Office of Environmental Services** provides matching grants to assist local environmental agencies in obtaining the financial resources necessary to inventory and document environmental resources; to prepare policy recommendations to protect those resources; and to prepare and disseminate information to the public concerning the ways in which the public can participate in protecting the environment.

Under **New Jersey's Waterfowl Print and Stamp Program**, NJ waterfowl stamp is required to be purchased when hunting waterfowl. Revenues from the stamp and royalties from the print are dedicated for funding the acquisition, protection, maintenance, improvement, and enhancement of waterfowl habitat and associated wetlands.

Under the **Federal Aid in Wildlife Restoration Program (Pittman-Robertson Act)**, Congress extended the life of an existing 10% tax on ammunition and firearms used for sport hunting which specifically earmarks the proceeds to be distributed to States for wildlife restoration. The funds are used to buy, develop, maintain and operate wildlife management areas.

The **1950 Federal Aid in Sport Fish Restoration Program** (known as the Dingell-Johnson Act and augmented by the 1984 Wallop-Breaux Act) is financed by an excise tax on fishing equipment to help States provide better habitat for

many fish species and more fishing opportunities for people. Under the Boating Safety Account of the Wallop-Breaux Trust Fund, of which the Coast Guard is the designated administrator, the states are given the discretion of applying any part of their allocation of federal financial assistance for the acquisition, construction or repair of public access.

\* **Land Trust Organizations** exist primarily to protect and conserve tracts of valuable open space for natural resource protection and recreational purposes. Most land trusts are directly involved in real estate transactions for these purposes and most hold and manage at least a portion of the land they act to protect. One common component of all land trusts is their non profit status. Gifts of land or money to these entities may, therefore, be tax deductible. Currently in New Jersey, the Trust for Public Land, The Natural Conservancy, and the NJ Conservation Foundation have been actively pursuing projects. Civic organizations and concerned citizens may also form local land trusts in order to preserve some aspect of their community.

APPENDIX 22

RESEARCH AND MONITORING PROGRAMS

## Monitoring & Research Programs

### A. Objectives - Monitoring Plan

In arriving at specific objectives, the Research and Monitoring Subcommittee borrowed heavily from the approach followed in the development of the Puget Sound Ambient Monitoring Program (PSAMP) (Puget Sound Water Quality Authority, 1990). The following objectives are taken from that program, with the exception of #8. Not all of the PSAMP objectives are included here, and some have been modified. The list provides a fairly comprehensive compilation of what an estuarine monitoring program should aim for.

1. Understanding natural oceanographic events and processes that may influence biota, water quality, and beneficial uses.
2. Determining trends and natural variability in abundance of biota, especially important resource species.
3. Determining trends in factors that may affect human health.
4. Determining trends in inputs and concentrations of anthropogenic pollutants, and trends in other human activities that may affect conditions in the bay.
5. Determining temporal and spatial trends of receiving system properties.
6. Determining the effects of changes in regulatory and management decisions and practices.
7. Determining trends in the aesthetic appearance of the bay.
8. Providing an early warning of detrimental or unwanted changes in the bay and its natural communities.

### B. General Scope and Organization of the Monitoring Plan

The Research and Monitoring Subcommittee has laid out the following design for a Barnegat Bay Ambient Monitoring Program. The program will collect and analyze samples and carry out surveys to determine the quality of the water, sediments, biological populations, and habitats of Barnegat Bay and its drainage basin, using appropriate protocols, quality assurance checks, and data storage and reporting procedures.

The subcommittee has not attempted, in this preliminary plan, to identify specific analytical techniques, sampling protocols, or other technical details for each component of the monitoring plan. Rather, the subcommittee has sought to identify the relevant technical and policy issues, existing monitoring programs, and data gaps and needs, and to link them together in a framework that would provide the information needed to answer the questions posed by resource managers and regulators. To the extent possible, the subcommittee has proposed existing programs and/or agencies that could carry out each component. Also included in the management plan is a base map of existing monitoring stations in Barnegat Bay and its contiguous near-coastal zone (between the Manasquan Inlet and Little Egg Inlet). These stations, which are

Growing Water Classification Program (DEPE Bureau of Marine Water Classification & Analysis) network of 3600 back bay stations statewide (350 in Barnegat Bay) and 400 ocean stations statewide (150 in Barnegat Bay), as well as 125 back bay/ocean stations in Barnegat Bay as part of the Coastal Cooperative Monitoring Program.

The subcommittee recommends the formation of a permanent monitoring oversight committee, comprised of representatives of DEPE and other involved agencies, researchers, citizens, and regulators and managers from all levels of government. This committee would review monitoring results and recommend changes to the program as needed. Furthermore, there should be created a permanent technical staff responsible for coordinating the many components of the monitoring plan, analyzing and interpreting results, and preparing annual reports for the oversight committee and the public.

### C. The Citizens' Monitoring Plan

In designing the Research & Monitoring plan, the subcommittee was aware of the work of the New Jersey Sea Grant Program in designing and organizing a Barnegat Bay citizens' monitoring plan. Indeed, the subcommittee saw an important role for citizen volunteers in any monitoring program for the bay, both as a way of supplementing the resources of state and other agencies and as an unsurpassed vehicle for increasing citizen awareness of and interest in the bay. A number of monitoring tasks described in this plan could be carried out entirely or in large part by citizen volunteers; these opportunities are noted in the relevant sections below.

The citizens' program should thus be seen as an integral component of the monitoring plan. The monitoring program staff should provide technical support for citizens' monitoring projects. Data collected under the citizens' monitoring program will be subject to the same (or similar) protocols and quality assurance checks as all other portions of the monitoring program.

### D. Factors Considered in Selecting Parameters

To move from general objectives to the selection of specific parameters that should be monitored, the Research and Monitoring Subcommittee used the PSAMP approach, which proceeds as follows: (1) list beneficial uses; (2) list adverse biological effects; (3) list natural and anthropogenic factors that affect the system; and (4) specify parameters that should be monitored, and match them with the plan's objectives.

#### 1. Beneficial Uses

The Research and Monitoring Subcommittee arrived at the following list of beneficial uses (Table 1) by starting with the PSAMP list and adding and deleting items as necessary in light of the particular uses of Barnegat Bay and information in the Barnegat Bay Management Recommendations (Rogers, Golden & Halpern, 1990b). Those uses marked with an asterisk (\*) were mentioned specifically by the Citizen Advisory Panel in the Management Recommendations. We have lumped some uses mentioned by the Panel together; others are omitted here, principally uses that do not depend on water or water quality (e.g., residential, forestry, restaurants, manufacturing). The first column lists the uses; the second lists measures of status (1) and controlling

**TABLE 1**  
**BENEFICIAL USES**

* ECOSYSTEM MAINTENANCE	Not easily measured
Detritus	(1) Abundance
Algae/macrophytes	(2) TSD (2) Nutrients (2) Turbidity (2) Habitat/substrate
Plankton	(1) Chlorophyll <u>a</u> (2) TSD (2) Nutrients (2) Turbidity
Benthos	(1) Abundance (2) Community structure (2) TSD (2) Food (2) Substrate
Shellfish	(1) Abundance (2) TSD (2) Turbidity (2) Food (2) Habitat/substrate
Fish	(1) Abundance (2) Physical habitat (2) Food (2) TSD
Birds	(1) Abundance, reproductive. success (2) Physical habitat (2) Food
Reptiles	(1) Abundance (2) Habitat (2) Food
Mammals	(1) Abundance (2) Habitat (2) Food
* WATER SUPPLY (INDUSTRIAL)	(2) Temperature (2) Turbidity
* FISHING/SHELLFISHING	(1) Abundance
* WATER CONTACT RECREATION	(2) Physical habitat (2) Odor (2) Turbidity

TABLE 1 CON'T

* BOATING	(2) Odor (2) Floatables
* HUNTING/TRAPPING	(2) Abundance
* AESTHETIC ENJOYMENT	(2) Water color (2) Odor (2) Turbidity (2) Floatables

## 2. Biological Effects

The PSAMP plan next lists "presently identified biological effects that should be monitored." (Table 2) These include such effects as reproductive failure in seals, fish kills, and closure of shellfish beds. For this step the Research and Monitoring Subcommittee selected only those effects that have been documented in Barnegat Bay, but also expanded the scope of the list to include all "use impairments," a term that includes but goes beyond biological effects.

TABLE 2  
BIOLOGICAL EFFECTS AND USE IMPAIRMENTS

<u>Effect</u>	<u>Parameters to Monitor</u>		
	<u>Possible Reason</u>	<u>Primary</u>	<u>Secondary</u>
Shellfish closures, restrictions	Pathogens/coliforms in bivalves	Pathogens in water	Pathogens in inputs and in tissue
Algal blooms	Nutrient inputs	Chlorophyll community composition	Nutrient inputs in water
Swimming restrictions	Pathogens/coliforms in water	Pathogens in water	Pathogens in inputs
Die-back of eelgrass	Elevated turbidity due to blooms and/or sediment	Turbidity light penetration	Chlorophyll, suspended solids nutrient inputs, nutrients in water, boating levels

### 3. Natural and Manmade Factors

Again following the PSAMP plan, the Research and Monitoring Subcommittee then compiled a list of natural and anthropogenic factors that affect conditions in the estuary. This is a rather standard list (Table 3) of oceanographic, climatic, hydrological, and human "driving forces" modified to provide more detail than the PSAMP plan and to add human factors not specifically mentioned there.

TABLE 3  
NATURAL AND ANTHROPOGENIC FACTORS

<u>Factor</u>	<u>Parameter(s)</u>
River and creek discharge	Flow, suspended solids, nutrients, bacteria/pathogens
Groundwater inputs	Flow, nutrients
Climate/water	Air temperature, insolation, precipitation, storms
Habitat changes	Percent of shoreline modified, dredging area/volume, extent/number of slips in marinas
Pollutant inputs	Loadings from point and nonpoint sources (including storm drains, atmospheric inputs, etc.)
Currents/mixing	Current speed and direction, tidal exchange
Regulatory/management controls	Changes in land use controls, restrictions on fertilizer use, buffer/drainage requirements, boating/dumping restrictions, fishery management, etc.
Socio-economic conditions	Population, land use/land cover in sub-watersheds, percentage of population on septic/community sewer systems, etc.
Recreational/commercial use	Boats in use, marina slips occupied, fishing effort/landings

#### 4. Parameters to Be Monitored

Combining the foregoing lists resulted in a set of parameters that should be monitored to meet the stated objectives of the monitoring plan. Following is a listing of parameters recommended to be monitored, with information on sampling frequency, number of stations, and relationship to other programs. "Objectives Met" refers to the list of objectives in Section B, above.

**Parameter(s):** Temperature, salinity, dissolved oxygen

**Objectives Met:** 1, 5

**Frequency:** Weekly

**Approximate Number of Stations:** 50

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

The Citizens' Monitoring Program being developed by Mr. John Tiedemann is ideally suited for monitoring of these standard water quality parameters (Tiedemann, 1991). Twenty-four sampling locations been identified. This will build on the quarterly sampling at thirty-three bay stations for these parameters begun last year by the Bureau of Marine Water Classification and Analysis, and on the monthly to twice-monthly sampling conducted at four bay stations by the Division of Science and Research.

**Parameter(s):** Nutrients

**Objectives Met:** 1, 4, 5, 6

**Frequency:** Monthly (October-May); Twice per month (June -Sept.)

**Approximate Number of Stations:** 33

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

This would essentially involve increasing the frequency of the quarterly nutrient sampling at thirty-three bay stations begun last year by the Bureau of Marine Water Classification and Analysis. The Division of Science and Research has also measured nutrients at four bay stations (two stations during the winter) semi-monthly to monthly since April 1988. In addition to those nutrients measured in the Bureau's existing program (ammonia, nitrate, nitrite, orthophosphate, and total nitrogen), other nutrients (e.g. total phosphate, dissolved organic and inorganic forms of nitrogen and phosphorus, and particulate forms) might be considered.

**Parameter(s):** Turbidity

**Objectives Met:** 1, 6, 7

**Frequency:** Weekly

**Approximate Number of Stations:** 50

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

As for temperature/salinity/dissolved oxygen, monitoring for turbidity (via Secchi depth measurements) could easily be folded into the Citizens' Monitoring Program. It would vastly expand Secchi depths measurements at four bay stations and suspended solids measurements at thirty-three bay stations made in the past several years by the Division of Science and Research and the Bureau of Marine Water Classification and Analysis.

**Parameter(s):** Pathogen indicators in bathing water and shellfish

**Objectives Met:** 3, 4, 5, 6

**Frequency:** Weekly (bathing areas in summer) to monthly

**Approximate Number of Stations:** 100

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

Fecal and total coliform bacteria levels are already monitored monthly, year-round, by the Bureau of Marine Water Classification and Analysis at some 350 back bay and 150 ocean stations in shellfish growing waters in Barnegat Bay and all of its tributaries, to the head of tide. This database covers the past 20 years. DEPE and the Ocean County Health Department also monitor fecal coliforms and enterococci at public bathing areas. These programs can be coordinated to provide adequate pathogens monitoring for the bay. It could be supplemented by pathogens monitoring in the shellfish themselves.

**Parameter(s):** Phytoplankton abundance/composition; chlorophyll a

**Objectives Met:** 2, 5, 8

**Frequency:** Monthly

**Approximate Number of Stations:** 2-4

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

DEPE's Bureau of Monitoring Management currently monitors phytoplankton abundance and species composition (including "red tide" organisms and chlorophyll a) at one location (Manahawkin) on a monthly basis; a northern bay station is also planned. Research conducted by the Division of Science and Research since 1989 has included monthly to twice-monthly measurements of chlorophyll a at four bay stations. Phytoplankton abundance and species composition, as well as chlorophyll a concentrations, should continue to be monitored at a small number of stations.

**Parameter(s):** Toxic contaminants in aquatic biota and sediments

**Objectives Met:** 3, 4, 8

**Frequency:** Annually to less frequently

**Approximate Number of Stations:** 5

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

Relatively little is known about levels of toxic contaminants (such as PCBs and chlorinated pesticides) in the biota and sediments of the bay. The DEPE's Toxics in Biota monitoring program has limited data on PCBs and pesticides in bluefish, weakfish, eels, and blue crabs from two stations in the bay. The National Oceanic and Atmospheric Administration's National Status and Trends Program (NOAA, 1989) monitors sediments and blue mussels (Mytilus edulis) collected annually at a single station in the bay (Barnegat Light) for PCBs, sixteen polycyclic aromatic hydrocarbons, chlorinated pesticides, trace metals, and Clostridium (a microbiological tracer of sewage (NOAA, 1991)).

The Research and Monitoring Subcommittee recommends a screening-level survey of selected toxic contaminants in sediments and important resource species in the bay (clams, crabs, selected finfish species). Such a survey would address concerns about toxics by supplementing the rather meager data base in this area. PCBs, pesticides, and trace metals would be included in such a survey. Depending on the results, a more focused monitoring program could be designed. Due to the great expense, the subcommittee hesitated to recommend a full program of routine, annual toxics monitoring without better baseline data.

**Parameter(s):** Histopathological abnormalities

**Objectives Met:** 8

**Frequency:** Annually or less frequently

**Approximate Number of Stations:** < 5

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

The incidence of histopathological abnormalities in key species (e.g., fin erosion in flounder, shell disease in crabs or other crustaceans) has been suggested as a useful monitoring parameter to reflect overall ecosystem stress, especially from toxic pollutants. As for toxic contaminants, a baseline survey would need to be done to determine the appropriate scope of such a monitoring component, and whether it would be useful.

**Parameter(s):** Macrophyte abundance

**Objectives Met:** 2, 8

**Frequency:** Monthly (summer)

**Approximate Number of Stations:** 2-4

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

No existing programs monitor the extent of submerged aquatic vegetation (mainly eelgrass, Zostera marina) in the bay. Eelgrass beds are known to provide important habitat for crabs and many fish species, especially for juveniles. They are also sensitive to changes in the turbidity of the overlying water, which in turn is affected by levels of phytoplankton and suspended sediments. Macrophytes may thus serve as good ecological indicators. DEPE's overall marine monitoring program could assume this function, which could perhaps be performed in conjunction with periodic summertime helicopter surveys.

**Parameter(s):** Shellfish and fish abundance

**Objectives Met:** 2, 6

**Frequency:** Annual

**Approximate Number of Stations:** 4

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

Shellfish and fish abundance are subject to significant natural variability, as well as being affected by fishing pressures, pollution, and other human pressures. It would therefore be difficult to link year-to-year changes with specific management actions or policies. However, a good long-term record is essential to drawing conclusions about the overall success of management and the general health of the bay. DEPE's marine fisheries and shellfish bureaus (the latter of which already performs shellfish surveys) could perform this function, focusing, perhaps, on key resource species (e.g., hard clams, blue crabs, and flounder). The design and results of the work of researchers at the Rutgers University Marine Research Station in Tuckerton on fish and shellfish diversity and abundance in lower Barnegat Bay could serve as the starting point for such a program.

**Parameter(s):** Benthic community structure

**Objectives Met:** 2, 5, 8

**Frequency:** Annually or less frequently

**Approximate Number of Stations:** 5

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

Changes in benthic community structure, including changes in species number or diversity, relative abundance, and identity of dominant species, could signal significant ecosystem-level changes. Surveys could be coordinated with surveys of fish and shellfish abundance.

**Parameter(s):** Floatables

**Objectives Met:** 6, 7

**Frequency:** Weekly (summer)

**Approximate Number of Stations:** Will vary

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

The presence and extent of floatables can serve as an easily measured and easily understood indicator of aesthetic appearance. We recommend that all monitoring programs conducted during the peak use season include at least qualitative reports of floatables.

**Parameter(s):** Shoreline habitats/sensitive areas

**Objectives Met:** 5, 6

**Frequency:** Every five years

**Approximate Number of Stations:** N/A

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

Field and (especially) aerial surveys of shoreline habitats (e.g., wetlands) and sensitive areas in the watershed will provide important information on the effectiveness of regulatory and planning measures taken to protect such habitats. This could be coordinated with periodic surveys already performed by DEPE's tidelands bureau.

**Parameter(s):** River discharge and quality

**Objectives Met:** 1, 4, 6

**Frequency:** Monthly

**Approximate Number of Stations:** 4-10

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

The Division of Science and Research (DSR) has monitored nutrients in four of the bay's tributaries (Metedeconk River, Toms River, Kettle Creek, and Cedar Creek) since 1989. The U.S. Geological Survey monitors flow and nutrient levels at one station on the Toms River, and maintains flow gauging stations on other streams. These programs should be used as the starting point for an overall nutrient monitoring program for the bay's tributary streams. The four streams chosen by DSR account for most of the river discharge into the bay; additional streams could be added to provide more complete coverage. The N.J. Geological Survey, other DEPE monitoring units, the U.S. Geological Survey or the Ocean County Health Department (whose existing monitoring program includes some river stations) could serve as the lead agency for this important program.

**Parameter(s):** Bird abundance, reproductive success

**Objectives Met:** 2, 8

**Frequency:** Annual

**Approximate Number of Stations:** 4

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

Measurements of the abundance of the numerous waterfowl and other birds that nest and/or feed in Barnegat Bay will provide another indication of the overall health of the bay. As is also the case for fish and shellfish, year-to-year variations will be less important than the long-term record.

Monitoring the reproductive success of a few species that nest, feed, and raise their young in the bay is a slightly more sophisticated method of using birds as an ecological indicator. Ideally, the species chosen should have a sizeable and well-defined population that uses the bay and its resources exclusively (or almost exclusively) during its breeding and nesting season, and have populations in other estuaries that could provide a basis for comparison. Colonial species, as opposed to those that nest apart, are easiest to monitor efficiently. Finally, species that feed on invertebrates or fish, and thus occupy a higher trophic level than herbivores, will be better "integrators" of overall ecosystem health. The success of the Manomet Bird Observatory's "Harbor Herons" project (Trust for Public Land, 1990) illustrates the potential usefulness of such a program. It could be undertaken by DEPE's Division of Fish, Game and Wildlife, or by outside researchers; in either case, substantial funds would be required.

**Parameter(s):** Toxic contaminants in birds

**Objectives Met:** 4, 6, 8

**Frequency:** Annually or less frequently

**Approximate Number of Stations:** 2-4

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

This program would complement the monitoring of bird abundance and reproductive success described above. As for aquatic biota, there is a need for screening-level survey of common pollutants such as PCBs, pesticides, and trace metals before a specific program can be designed.

**Parameter(s):** Boating use

**Objectives Met:** 4, 6

**Frequency:** Monthly to annually

**Approximate Number of Stations:** N/A

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

Recreational boating is an important and intense use of the bay. The monitoring program should include the collection of data that can show trends in this activity. Annual surveys of the number of marina slips occupied will yield information on overall boating pressure; monthly (weekend and weekday) surveys of the number of boats on the bay (either bay-wide or in a given portion of the bay) will yield data on boating intensity. This latter activity could be part of DEPE's periodic summertime helicopter surveys of the shore.

**Parameter(s):** Atmospheric (and other) pollutant inputs

**Objectives Met:** 4, 6

**Frequency:** Annually

**Approximate Number of Stations:** N/A

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

Direct atmospheric inputs of pollutants, especially nutrients, may be a significant component in overall pollutant loading. Such information could be collected by DEPE, or could be gleaned from programs conducted elsewhere in the Northeast. Long-term trends, and not year-to-year changes, are most important.

**Parameter(s):** Climate/weather data

**Objectives Met:** 1

**Frequency:** N/A

**Approximate Number of Stations:** N/A

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

NOAA's climatological data (air temperature, insolation, rainfall, and other climate parameters) are acquired annually on disk by the DEPE's Geological Survey and should be available to the Barnegat Bay Management staff.

**Parameter(s):** Groundwater discharge and quality

**Objectives Met:** 1, 4

**Frequency:** Annual

**Approximate Number of Stations:** 5-10(?)

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

The existing program of the Ocean County Health Department, in which groundwater at 150 sites (fifty sites each year on a rotating basis) is monitored for bacteria, metals, nitrogen, phosphorus, and hardness, could serve this function. The specific forms of nitrogen and phosphorus measured and the analytical techniques used would need to be consistent with those selected in the monitoring programs for the bay and for rivers. A small subset of the stations monitored by the county would likely be sufficient.

Groundwater discharge to the bay, the other critical parameter in determining nutrient loading to the bay from groundwater, is not well characterized. However, once it is characterized, groundwater flow should not be subject to extreme variation from year to year. We therefore do not recommend routine groundwater flow monitoring, but rather research to characterize the magnitude of direct groundwater discharge to the bay.

**Parameter(s):** Fishing effort and landings

**Objectives Met:** 2, 4, 6

**Frequency:** Annual

**Approximate Number of Stations:** N/A

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

Annual surveys of fishing effort and landings (at least for important resource species) provide critical data for any effort to manage the bay's fisheries resources. DEPE's marine fisheries and shellfish bureaus are responsible for such an effort. Important species for such a program include hard clams, blue crabs, and flounder. (See also section on fisheries management.)

**Parameter(s):** Dredging (area and volume)

**Objectives Met:** 4

**Frequency:** Annual

**Approximate Number of Stations:** N/A

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

Information collected by DEPE regulatory programs responsible for dredging and dredged material disposal practices should be provided to the Barnegat Bay Ambient Monitoring Program. Such information is needed for a full assessment of habitat conditions and changes.

**Parameter(s):** Regulatory and management measures

**Objectives Met:** 6

**Frequency:** Annually

**Approximate Number of Stations:** N/A

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

The scope and nature of regulatory and management initiatives by federal, state, county or local agencies regarding land use, water quality, habitat protection, and other areas likely to affect the bay should be compiled annually, by the permanent technical staff.

**Parameter(s):** Socioeconomic conditions

**Objectives Met:** 4, 6

**Frequency:** Annually or as available

**Approximate Number of Stations:** N/A

**Rationale/Lead Agency/Relationship to Other Monitoring Programs:**

Data on population levels, land use/land cover in sub-watersheds, and other relevant parameters (e.g., percentage of population on septic systems or community sewer systems) should be compiled periodically, as was done for the Barnegat Bay Profile. This information is a necessary part of any effort to interpret changes in the bay's water quality.

**Parameter(s):** Rare plant and animal populations

**Objectives Met:** 2,5,6,8,

**Frequency:** 5 year intervals to determine trends

**Approximate Number of Stations:** 117 species, 624 total occurrences

**Rationale/Lead Agency/ Relationship to Other Monitoring Programs:**

It is important to monitor existing populations of endangered species to determine if land use protection measures proposed in the Plan are working to preserve species and their habitats. Additional rare species should be monitored as general indicators of the health of the Bay ecosystem's biodiversity. After the first baseline inventory, monitoring surveys should be conducted at five year intervals. The Natural Heritage Database is designed to track the information to be gathered including population, size, habitat quality, management needs, etc. The State Endangered and Nongame Species Program surveys rare animal species and the State Natural Heritage Program conducts surveys of rare plant species, but neither program has the funds necessary to carry out adequate monitoring programs for the study area.

## E. Chesapeake Bay Program Approach

### 1. Management Issues

Any environmental monitoring program must be designed to answer not only technical or scientific questions but to address important management issues as well. In fact, this may be viewed as its primary function. Presumably, beginning with beneficial uses and moving on to select parameters, as in the PSAMP approach described above, will ensure that the relevant issues are covered. Still, as a check on the adequacy of the proposed program, the Research and Monitoring Subcommittee followed the approach suggested by the Chesapeake Bay Program (Maryland Department of Health & Mental Hygiene, 1987). That approach calls first for listing the management issues that are driving the program. Review of the Barnegat Bay Management Recommendations (Rogers, Golden and Halpern, 1990b) yielded the following set of issues:

- Control of NPS pollution from both existing and new development
- Maintenance of beneficial uses of the bay
- Preservation of open space in the watershed
- Protection of sensitive areas (wetlands, submerged aquatic vegetation, fish spawning/nursery/migratory areas, colonial waterbird nesting areas, sites associated with endangered or threatened species, waterfowl staging areas, clam beds)
- Various issues associated with boating (allocation, restrictions, use conflicts, waste disposal)
- Fishery resources (safety, sustainability, enhancement)
- Access (needs and impacts)
- Data gaps (privately funded dredging, sediment toxicity)

### 2. Management Questions

The CBP then calls for development of a set of management questions that should be addressed by the monitoring plan. The plan separates these questions into three categories (trends, characterization, processes & causes). After finding that many questions seemed to fit on more than one category, the Research & Monitoring subcommittee decided to compile a single list of potential management questions pertinent to Barnegat Bay. The monitoring plan, as described, should be able to address these questions.

- Is the level or extent of (dissolved oxygen, turbidity, primary production, submerged aquatic vegetation) changing? - Are stocks of important resource species going up or down?
- Are coliform (or other indicator) levels changing (winter/summer, wet/dry weather)?
- Is the bay "healthy," as reflected by ecological indicators?

- Is land use in the watershed changing?
- Are the fish and shellfish safe to eat?
- Is it safe to swim in the bay?
- Where are the critical areas for preservation of wildlife?
- Is access to the bay adequate?
- How much nitrogen and phosphorus enter the bay from various sources? How much could be controlled?
- How many boats use the bay? Has this number increased or decreased? How many marina slips are there? How much habitat is lost to marina development?
- How much dredging takes place? Where? And where is the material dumped?
- How does runoff quality (or storm drain discharge) change under various development scenarios, and with various controls (buffers, etc.)? (See Research discussion below.)

#### F. Ecosystem Indicators

Of particular importance among the parameters discussed above are ecosystem indicators. These are parameters that provide fairly direct information about ecosystem health by integrating different processes and/or trophic levels and can therefore be understood as reflecting the ecosystem as a whole, rather than a narrow portion of it. Good ecosystem indicators are also understandable, without extensive analysis or technical explanations, to the general public. In that sense they play an educational and public awareness role as well as a technical or "managerial" role. They could, for example, serve as the basis for periodic "State of the Bay" reports.

In light of these criteria, possible ecosystem indicators among the parameters discussed above include:

- Dissolved oxygen in bottom waters
- Percentage of shellfish beds meeting water quality standards
- Percentage of the bay meeting "swimmable" criteria
- Acres of submerged aquatic vegetation
- Number of nesting bird pairs/numbers of young fledged

#### G. Data Management and Storage

Perhaps the most important function of the permanent technical staff will be data management. The value of the monitoring program to managers, regulators, and the public will depend to a great degree on the timely analysis,

be seen as a critical component of the monitoring program, and not merely as an ancillary or "after-the-fact" activity.

In addition to being stored in paper and computer formats that are accessible and clear, the monitoring data should be linked with DEPE's Geographical Information System (GIS) in the Division of Science and Research. As illustrated by the work of Rogers, Golden and Halpern (1990a) in drawing up the Barnegat Bay profile, the GIS can be an extraordinarily useful tool in organizing and analyzing environmental data.

### **III Research**

Research into the basic biological and physical processes that "drive" the bay (the causes and solutions of pollution patterns and impaired uses, and better ways to monitor the bay's health) is an essential complement to the ambient monitoring program. The two activities (research and monitoring) proceed along different timetables and have different goals, but can and should inform each other so that each is refined and improved by the results of the other.

The Research and Monitoring Subcommittee has identified several areas in which research is critically needed. These include:

- Nutrient cycling and nutrient budgets
- Toxic contaminants in sediments, aquatic biota, and birds (to lay the foundation for potential monitoring program components)
- Magnitude of direct groundwater discharge to the bay
- Relative impact of phytoplankton blooms and sediment resuspension on turbidity changes
- Biogeochemical cycling of pollutants
- Extent and seriousness of physical abnormalities in key species, e.g. fin erosion in flounders, shell disease in blue crabs (to lay foundation for potential monitoring program component)
- Impact of boating and other recreational activities, e.g., on submerged aquatic vegetation (via direct disturbance or through effects on turbidity)
- Pollutant loadings from power boats
- Modelling of water quality, nutrient cycling, etc. to identify control strategies
- Identification of eroding shorelines and estimation of erosion rates; determination of causes and erosion prevention strategies
- Effect/effectiveness of development controls, nonpoint source controls (e.g. buffers), etc. on runoff quality and storm drain discharge quality

However, the subcommittee did not conclude that it had identified all important research questions. The list above is offered as a starting point for a larger discussion.

A mutually acceptable set of priorities for research in Barnegat Bay needs to be developed by the scientific community, resource managers, policy makers, other involved parties and the general public. The Research and Monitoring Subcommittees (both NJDEPE and citizens' groups) should form the Research Committee that includes representatives of academic institutions, state and federal agencies, the business community, agriculture, environmental groups and private research organizations. This committee would develop a process for establishing research priorities in Barnegat Bay and then generate a ranked list of priorities for funding.

In addition to identifying and ranking research priorities, the committee will:

(1) provide a closer connection between the research agenda of the scientific community and the information needs of managers, regulators and those involved in decisions to manage the bay; and,

(2) provide a focal point for investigations that increase our general knowledge of the Barnegat Bay system but are beyond the purview of a single agency.