SECTION II

INVENTORY AND ANALYSIS

OVERVIEW

The Village of Croton-on-Hudson is located on the eastern side of the Hudson River approximately 40 miles to the north of Manhattan. The Village, covering 4.5 square miles, is in the Town of Cortlandt in the northwestern portion of the County of Westchester.

The boundaries of the Village of Croton-on-Hudson form a somewhat triangular shape. The middle of the Hudson River, running in a North-South direction, forms one side of the triangle. The Hudson River then intersects with the mouth of the Croton River which flows to this point from a north easterly direction. The Croton River forms the second side of the triangle. The third side is an artificially drawn line running from the Village boundary line at the Croton River in a north westerly direction back to the Hudson River. This line separates the Village of Croton-on-Hudson from the Town of Cortlandt.

The portion of the Village line which is not bounded by either the Hudson River or the Croton River is generally of a hilly and wooded nature. These hills slope naturally toward one or the other Rivers which has the effect of orienting the entire Village toward the waterways that form most of its boundary. Many buildings that are situated on the hills in the Village face either the Croton River or the Hudson River in order to take advantage of the magnificent views afforded by Croton's unique location.

Along the Croton River to the east, fast-running water is viewed down steep banks to the River's edge. Large outcroppings of rocks and a wooded shoreline is typical of the entire coastal zone boundary formed by this River. Looking west across the Hudson, the panorama of Haverstraw Bay and the hills of the upper Palisades provide the visual focus.

The population of Croton-on-Hudson in 1980 was 6,889. Over the past 30 years the population has fluctuated as shown below:

Year	Population	Percent Change
1950	4,837	
1960	6,812	20.4
1970	7,523	10.4
1980	6,889	-8.4
1990	7,018	1.8

Source: US Department of Commerce, Bureau of Census.

Pressures for development of both a residential and commercial nature have been increasing in Northern Westchester in the past several years. These pressures, which have already directly affected Croton-on-Hudson both by proposals and projects within and outside of the Village, are expected to continue in the future.

Currently, there are conventional single-family subdivisions and high density residential developments totaling approximately 617 units which are in various stages of review or are already under construction in Croton. Additional proposals for development can be expected for the few remaining large parcels of open land that exist within the coastal zone area. The Village of Croton-on-Hudson is also being seriously affected by the traffic and demand for commuter parking generated by large-scale residential developments outside its boundary to the north and south. The effects of these developmental pressures create several major issues for the future of Croton-on-Hudson which include environmental concerns, visual impacts, quality of life, traffic, historic preservation and public access to the waterways. Village residents and officials have increasingly expressed concerns about the possible detrimental effects current and proposed future developments will have on the Village.

For purposes of best describing the results of the inventory of current land and water uses, the Croton-on-Hudson coastal zone area has been divided into three sections (see Figure 3). Each section has one or more particular characteristics which give it a special identity and to a large extent defines its current land and water use. Of course, as with all arbitrary distinctions, there is some overlap of these special characteristics between the three sections. Figure 3 also includes some land use details referred to in the text.

Figure 4 which follows, present Existing Land and Water Uses within the coastal zone. Figure 4 is an updated version of the state's land use map of the Village. Figure 5 (in the back pocket) is the official existing zoning map for the Village.

A. EXISTING LAND USE

1.0 The Hudson Riverfront Section

This section of the Village is bounded on the west by the Hudson River, on the east by Route 9, on the south by the Croton River at the Village's southern boundary, and at the north by the Village's northern boundary along Furnace Dock Road (see Figure 3). It stretches in a north-south direction along the water's edge to the tip of Croton Point Park, around the edge of Croton Bay and back to Route 9. A very small peninsula of land, extending north from Ossining and consisting mainly of railroad beds, is also included in this section. The overwhelming characteristic of this section is its direct frontage on the Hudson River. This advantageous position has made it highly susceptible to development pressures.

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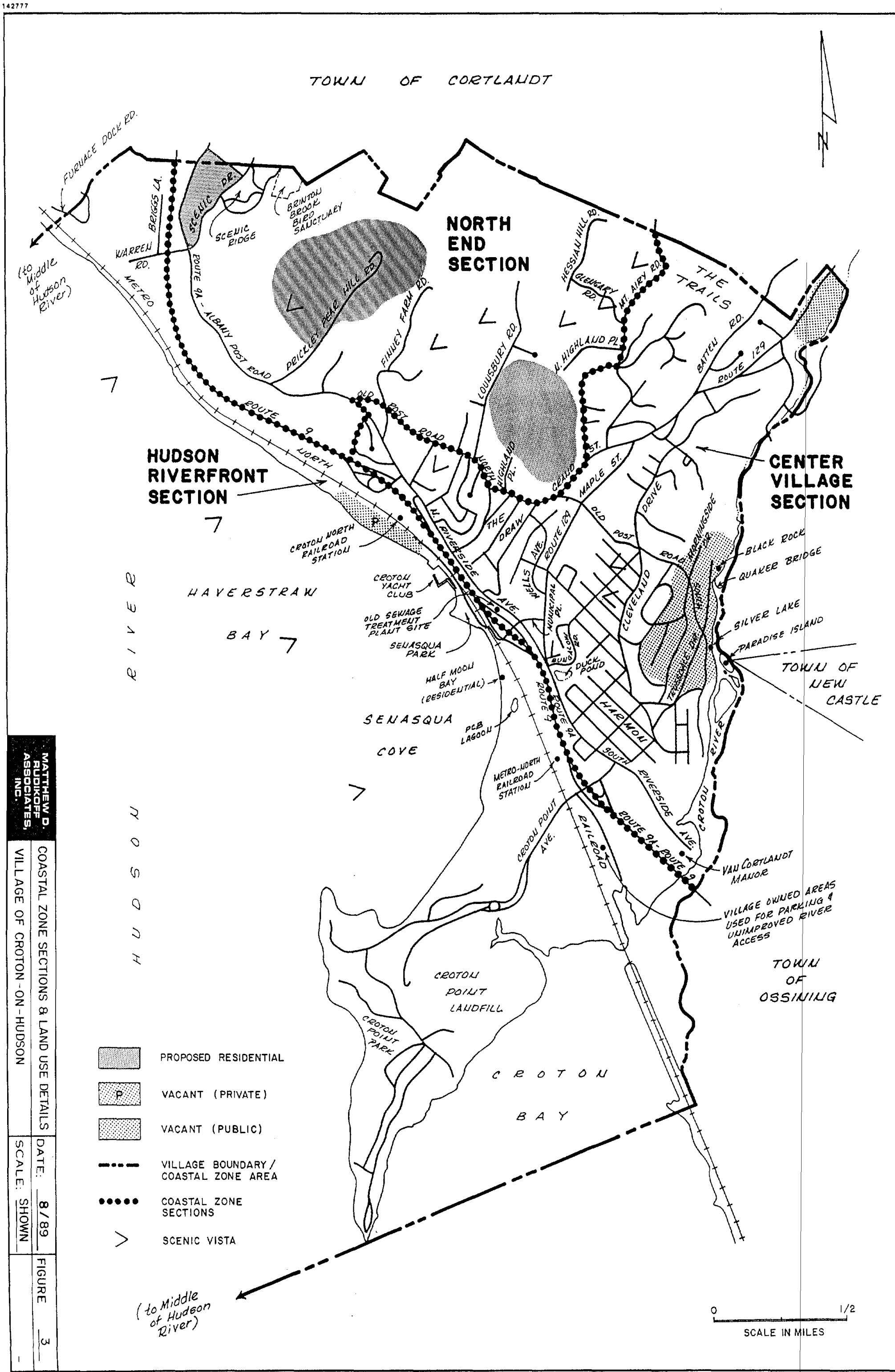


MATTHEW D. RUDIKOFF ASSOCIATES, INC.

COASTAL ZONE SECTIONS & LAND USE DETAILS

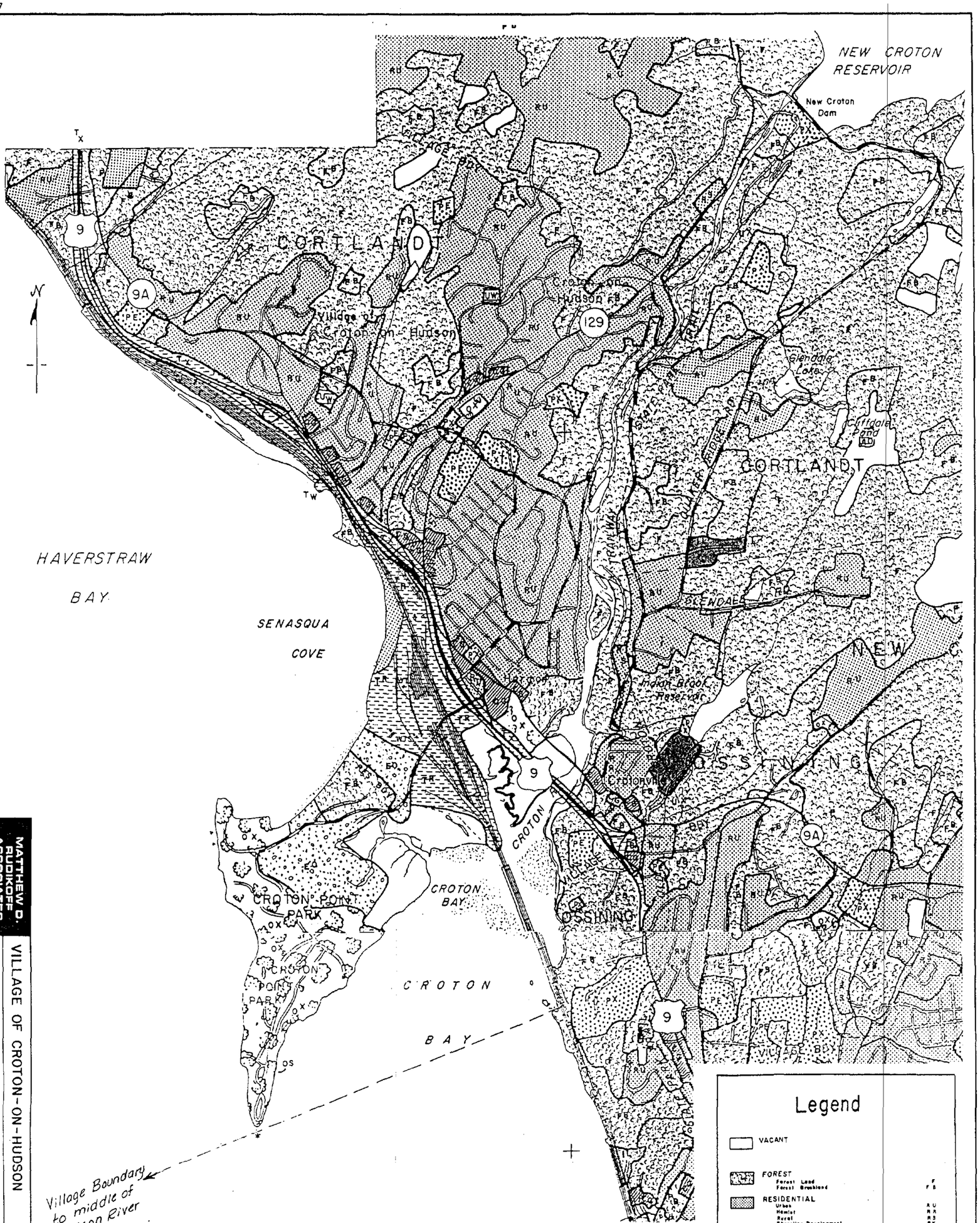
VILLAGE OF CROTON-ON-HUDSON

SCALE: SHOWN

DATE: 8/89

FIGURE 3

142777



Legend

VACANT

FOREST
- Forest Land — F
- Forest Brushland — FB

RESIDENTIAL
- Urban — RU
- Hamlet — RH
- Rural — RR
- Shoreline Development — RK

COMMERCIAL
- General Commercial — CG
- Resorts — CR

PUBLIC & SEMI-PUBLIC INSTITUTIONS & FACILITIES
- Educational — PE
- Medical & Health — PH
- Other — PX

INDUSTRIAL
- Light — IL
- Heavy — IH
- Oil & Gas Storage — IS

EXTRACTIVE
- Shaft Mining — ES
- Open Pit, Quarries — EQ
- Oil, Gas, Sulphur & Other Wells — EW

RECREATION *
- Beaches & Pools — OS
- Camping Areas — OC
- Marinas & Boat Launching Sites — OB
- Other Recreational Uses — OX

TRANSPORTATION
- Airports & Related Facilities — TA
- Railway Facilities — TR
- Water Transport Facilities — TW
- Other Transportation Facilities — TX

COASTAL AREA BOUNDARY

* Ownership: State (S), Other Public (P), Private (V) e.g. OS-P

SOURCE: "Existing Land & Water Uses, New York State Coastal Management Program, Base Maps WC-5 & WC-6, 7/78, Revised 12/88

Updated 1988 by Waterfront Revitalization Committee

MATTHEW D. RUDIKOFF ASSOCIATES, INC.

VILLAGE OF CROTON-ON-HUDSON

EXISTING LAND & WATER USES

DATE: 5/89

SCALE: 1" = 2000'

FIGURE 4

2.0 The Center Village Section

This section of Croton-on-Hudson has two chief characteristics. It encompasses the second major waterway in the coastal zone - the Croton River. It also contains the majority of the residences and commercial establishments which exist in the Village. Developmental pressures are less severe in this section than in the other two because of the lack of available privately held land.

The Center Village section is bounded by Route 9 to the west (see Figure 3). The intersection of Route 9 with the Croton River is the southernmost point of this section. The line extends along the Croton River in a northeast direction to the Village boundary line. From this point, the Center Village section extends northwest along the boundary line to Mt. Airy Road, along Mt. Airy in a southwest direction to Grand Street, along Old Post Road North to its intersection with Route 9A (N. Riverside Avenue), south on Route 9A to Wolf Road and then along an arbitrary line to Route 9.

3.0 The North End Section

The North End section of the Croton-on-Hudson coastal zone area is steeper, less densely populated and contains the last remaining large parcels of undeveloped land in the village. As such, it us under the same developmental pressure as is the Hudson Riverfront section.

The North End is bounded on the west by Route 9. From the point at which Route 9 meets the northern boundary line of the Village, this section follows the Village boundary line in an easterly direction to Mt. Airy Road. From this point the border of this section runs along Mt. Airy Road to Grand Street, to Old Post Road North, to North Riverside Avenue, to Wolf Lane and along an arbitrary line back to Route 9.

1.0 Hudson Riverfront Section

1.1 Residential

Two areas of the Hudson Riverfront section are currently in residential use. At the extreme north end of this section on Furnace Dock Road, Warren Road and Briggs Lane, a small group of single family homes exist - approximately 35 in number. Most are on lots of at least 1 acre which is the current zoning of this area (RA-40). Some smaller properties in this area pre-exist the current zoning or were made smaller when Route 9 was built. The single family homes on these three streets surround approximately 40 acres of wooded land owned by the National Audubon Society.

Near the southern end of this section directly on the water's edge, construction of a high-density condominium development is currently being completed. Known as Half Moon Bay (formerly the River Club), this project was constructed on a site rezoned RDU

(Riverfront Development Use) and consists of 120 attached townhouses. Development plans include a 300 slip marina and public restaurant. A public walkway along the River was included in the development plans at the urging of Village officials and residents.

1.2 Commercial Use

There are few commercial buildings in the Hudson Riverfront section. On Croton Point Avenue, at the entrance to the railroad station, two buildings are used for retail and office purposes.

Near the Senasqua Road exit from Route 9, the former Croton North Station is now privately owned and used for commercial purposes.

The boundaries of the Hudson Riverfront section bisect the commercial areas of the Village. Therefore, other commercial buildings exist and are located adjacent to the boundaries of this section.

1.3 Industrial Use

The predominant land use in the Hudson Riverfront section, aside from recreational areas at Croton Point Park and Senasqua Park, is industrial or transportation-related. The Metro North railroad, which occupies approximately 100 acres, dominates the central area in this section with numerous switching tracks and the Harmon railroad yards. Croton-on-Hudson is the major switching location for north/south Metro-North and Amtrak trains running along the Hudson River. The Harmon railroad yard is also where Metro North trains are sent for repair. This same industrial area also contains a large warehouse, formerly owned and used by Georgia-Pacific, but now leased by Metro North.

The Croton-Harmon railroad station is the chief transportation site in the entire Croton-on-Hudson coastal zone area and indeed in the surrounding area of Westchester County. The station is located adjacent to the Hudson River, just to the east of Croton Point Park. It is the first sight to be seen by people entering the Village from the south along Route 9. A large expanse of public and private commuter parking is associated with this station.

Other transportation-related use includes the NYS Route 9 and right-of-way which comprise a significant portion of land in the Riverfront Section.

1.4 Public Buildings

There are no public buildings (municipal buildings, schools) located in the Hudson Riverfront section.

1.5 Recreation

Croton Point Park, a Westchester County owned park, is the largest recreational site in Croton-on-Hudson. It is located at the south end of the Hudson Riverfront section on a point extending out into the Hudson River. Croton Point is visible from many miles to the north and south along the Hudson River.

Also within the Hudson Riverfront Section is Senasqua Park, a Village-owned park and the Croton Yacht Club. The Yacht Club site is owned by the Village and leased to the Yacht Club. The current lease expires in 1992. Approximately 40 acres off of Furnace Dock Road is owned by the Audubon Society and available for public recreational use. See Section E for a complete description of recreation resources.

1.6 Vacant and Disused

Two publicly-owned vacant sites exist in the area between the Harmon railroad yards and tracks to the west and Croton Point Park to the east. In addition, as mentioned in Section B: Hazardous Wastes, the large County-owned Croton landfill site in the middle of Croton Point Park is considered as currently "disused".

Along the northern part of the Hudson Riverfront section, directly on the water's edge, there is a narrow stretch of privately-owned vacant land of approximately 18 acres. This site was previously in industrial use. Various proposals have been made to develop it for high density residential purposes although no proposals are currently active. Access to this piece of land is extremely difficult because the railroad tracks separate it from all streets and highways.

1.7 Analysis of Existing Land Uses in the Hudson Riverfront Section

Land use in the Hudson Riverfront section is predominantly of an industrial and railroad-related nature. A growing residential presence is beginning to be felt here with the construction of the Half Moon Bay housing development. In spite of this section's ideal location on the eastern shore of the Hudson River, its current water-related uses are limited and mainly seasonal in nature.

At this section's northern end, north of Senasqua Park and the Croton Yacht Club on the Hudson River, a stretch of 18 privately owned acres exist in an undeveloped state. Since this is the last remaining large parcel of open land actually on the River, every effort should be made to ensure that future proposals for it include substantial opportunities for public access to the Hudson. These opportunities might include both walking and bicycle paths, nature trails, a bandstand, picnicking and beach areas. At the same time all proposals for land use in the Hudson Riverfront section must avoid uses that would havedeleterious effects on the natural habitats of fish and wildlife or become visual eyesores along the River.

2.0 The Center Village

2.1 Residential

This portion of the Croton-on-Hudson coastal zone area is where the majority of Croton's residential housing exists. Most of the homes are single family residences situated on small lots. In the extreme northeast portion of this Center Village section, a new development on Georgia Lane consists of about 20 homes on lots of 1 acre or more. Large parcels of 1 acre or more are also to be found along Mt. Airy Road between its Grand Street connection and the Village boundary line.

An area known as the "Trails," a hilly area with narrow roads that is bounded by Mt. Airy Road, Grand Street, and Batten Road, is an unusual mixture of old, new, rustic, contemporary, large and small homes on varying size plots. Until 1931, the Trails were not part of the Village of Croton-on-Hudson. It was originally a summer community and was independently managed by a private homeowners' association -- the Mt. Airy Associates. The variety of homes and lot sizes in this area is partially a reflection of its independent past.

Single family homes in this area range in age from those built in the middle to late 1800s to new homes. The area to the east of Maple Avenue (Route 129) and bounded by South Riverside Avenue is frequently referred to as "Harmon." This area was initially developed by Tom Harmon as a residential area for railroad employees. Most of the homes were built between 1920 and the early 1960s. Like the Trails, Harmon also existed as a separate entity from Croton at one time (see History).

Although there are very few multi-family residences in Croton-on-Hudson, two of the largest exist within the Center Village section - Bari Manor, off Old Post Road South, and Van Wyck Towers on Grand Street. Bari Manor consists of three two-story buildings containing 82 rental apartments. Van Wyck Towers, built in 1929, is a six story building with 35 rental apartments. There are also several other multi-family residences scattered about the Center Village section -each containing from four to ten units.

2.2 Commercial

Just as most of the residences in the Village are located in the Center Village section, so also are most commercial establishments. Within this section, three identifiable commercial areas have emerged.

The principal commercial area runs along South Riverside Avenue from Municipal Place in the north to its end in the south, just past Croton Point Avenue. Along this stretch can be found many varieties of commercial establishments. In addition to retail stores and offices, there are two banks, six gas stations, two car dealerships, a 10-store

shopping center with a Shop-Rite anchor and several restaurants. In addition, along North Riverside Avenue, there are two commercial enterprises that rely on being close to the waterfront - a boat dealership and repair shop and a small bait and tackle shop.

The area known as the Upper Village is the second largest commercial area. The boundaries of the Upper Village extend roughly from the intersection of Van Wyck Street and Old Post Road North to Grand Street and then to Route 129 (Maple Avenue). Old Post Road North, where it forms an intersection with Grand Street, is also part of the Upper Village commercial area. Retail stores, doctors' and lawyers' offices and restaurants are predominant in this area. There are no gas stations or garages in the Upper Village.

An area known as the Lower Village runs along the east side of North Riverside Avenue from Prospect Avenue in the north to Municipal Place in the south. The lower Village has a large number of commercial establishments. Small retail stores, offices, a car dealership, a masonic hall, an auto repair shop and a boat dealer are located in this area.

There are no buildings on the west side of North Riverside Avenue in this area as it fronts directly on Route 9. In the past however, this area was the major commercial section of the Village.

A few other commercial sites are scattered throughout the Center Village section. These consist mainly of doctors' and real estate offices.

2.3 Industrial

There are no industrial uses in the Center Village section.

2.4 Public Buildings

Almost all of the public buildings that exist within the Croton-on-Hudson coastal zone are to be found in the Center Village section. These consist of the municipal building, firehouses, library, three public schools and the Bethel cemetery.

2.5 Recreation

Several sites in the Center Village section have recreational uses. These include a number of small public parks, playing grounds behind Carrie E. Tompkins Elementary School and Dobbs Park on Maple Avenue. Also in this Center Village Section are Duck Pond, a number of islands within the Croton River, including Paradise Island and Silver Lake, and Van Cortlandt Manor, a private historical site. See Section E for a description of these recreation areas.

2.6 Vacant and Disused

Along the Croton River, southeast from the Village boundary line to the Village-owned land at Silver Lake Park, there is a long stretch of Village owned land that is vacant. This land is directly on the Croton River. One part of this stretch is known as Black Rock. Black Rock was turned over to the Village by Westchester County in 1979 with the stipulation that within five years of the agreement the Village would develop the area for use as a municipal park and recreational area. Although no such development has occurred to date, the Village is considering plans to develop it for passive recreation use. Tenants living in substandard houses at Black Rock have been evicted, and the structures demolished. This waterfront area now remains mostly vacant. Black Rock is also the site of the Village well heads -the source of Croton's water supply.

The Village of Croton-on-Hudson and the school district also own some additional vacant land inland from the Croton River and northeast of the Carrie E. Tompkins Elementary School.

Privately owned parcels of vacant land also exist in the Trails area and along Batten Road. These parcels range in size from one-half acre to several acres.

Between Grand Street and Wells Avenue, along Beekman Avenue, there are many privately-owned lots that until recently were undeveloped. This area, known as "the Draw," has been developed with single-family houses. The 65 homes are being constructed on lots approximately 50 feet by 100 feet in size. However, the drainage systems and sedimentation control mechanisms implemented during construction of these residences resulted in certain flooding and sedimentation problems. Zoning in this area is RA-5, single-family residential, 5000 square feet.

The old Village sewage treatment plant site is located in the Center Village section. The site, approximately 1.5 acres in size, is located between Route 9 and South Riverside Drive, just north of Municipal Place. The site presents a unique opportunity for the development of commercial, cultural or recreational uses. The site has been sold and plans submitted for an office building. Located near major intersections, the site provides for good vehicular access. Any development of this site must be compatible with the character of the area, with consideration given to scale, architectural style, density, and intensity of use.

2.7 Analysis of Existing Land Uses in the Center Village Section

The Center Village section constitutes the core of the Village of Croton-on-Hudson, both residentially and commercially. With the additional aspect of the recreational opportunities provided by the Croton River, the Center Village section has evolved into the focal point of most Village-related activities.

The Croton River is the predominant natural resource in this section. From its inception at the Croton Dam to its confluence with the Hudson River at Croton Bay, the beauty of the River with its wooded shoreline, fast moving water and outcroppings of rock, provides unlimited opportunities for enjoyment by those residents who walk along its edge.

Residents living along Truesdale, Morningside and Nordica Drives, bordering on the Croton River, benefit from their views of its natural beauty.

Almost all of Croton's "neighborhood" residences, schools, offices, commercial establishments, religious buildings, and playgrounds are in this section. The Croton Free Library and the Croton-on-Hudson Municipal Building are also located here. Because the Center Village section is buffered somewhat by the Hudson River Section and the North End Section of the coastal zone area, it has been able to retain many aspects associated with a more rural village. This is still true in spite of the large amount of development occurring both north and south of the Village of Croton-on-Hudson. Nevertheless pressures are mounting to make changes in the Center Village section that would alter this valuable rustic characteristic of Croton.

Traffic flow and parking within the Center Village section have become increasingly difficult problems. Many of the streets in this section are steep and narrow, particularly those streets in the "Trails" area, the streets around the Municipal Building and the streets near and bordering on the Croton River.

Many houses along these streets were built without garages. As a result, residential parking on Center Village streets is common. On-street parking is common throughout this section where small lots with minimal driveway space are not able to accommodate the demands of multi-car families. This combination of narrow streets and on-street parking is likely to be further exacerbated with the construction of new residences and expansion of local businesses.

The desire to create housing in the Village of Croton-on-Hudson has not only spawned proposals for expensive new developments but also proposals for affordable housing. Since new construction is very costly and the amount of available land is limited, accessory apartments have been suggested as a possible solution to this problem in the Center Village section. While this would take advantage of an already existing stock of housing in the Center Village, it would also have the effect of increasing the density of the section. Current zoning regulations provide for accessory apartments to be permitted under certain conditions where the owner is over 55 and the apartment is to be used for family members. Proposals to modify these restrictions on accessory apartments must take into consideration the accompanying increased density, the current parking and traffic problems, the results of the water study, the impact on the Village sewer system, and the preservation of the neighborhood atmosphere of this section of the Village.

3.0 The North End Section

3.1 Residential

The section of the coastal zone area referred to as the North End contains most of the undeveloped land in Croton-on-Hudson. The North End section is generally very steep with only a single major road (Route 9A-Albany Post Road and Old Post Road North) bisecting it in a north-south direction. There are very few cross roads. As a result of these factors, the residences in the North-End tend to be on large plots of land adjacent to the main north-south road. Most are single-family residences. Along Route 9A, many of these residences are not visible as long driveways lead either west towards the Hudson or east, up into the open hilly spaces. A few streets in the North End section, including the east side of Old Post Road, Lounsbury Road, Highland Place and North Highland Place, Glengary Road, and Hessian Hills Road, have single-family residences and resemble neighborhoods when viewed from the road.

Two long private roads in the North End, Prickly Pear Hill Road and Finney Farm Road, extend eastward into the hills from Albany Post Road and Old Post Road North. These steep roads provide access to a number of single family residences which generally are large and secluded.

Two high density residential sites are also located in the North End section of the Village. These sites are in contrast to the generally low-density that prevails in the area. One, the Skyview Nursing Home, provides a residence for the elderly in need of nursing care. A development known as Scenic Ridge is the second site of high density residential use in the North End. Built approximately ten years ago, Scenic Ridge is a community consisting of 17 groups of attached single family dwelling units in groups of four to seven totalling 97 units in all.

Located at the extreme northern end of the Village, Scenic Ridge is adjacent to Amberlands, a large apartment complex (31 buildings of three-stories with 24 apartments each) built by the same developer in the Town of Cortlandt. Together, these residential developments form an extremely high density residential area.

3.2 Commercial

There are very few commercial uses of land in the North End Section. The primary exceptions are the ten to fifteen small stores, restaurants and offices that run along the north side of Grand Street. Near the northern Village boundary, there are also three former homes being used as small offices, one small corporate office building (the Hendry Corp.) and a fruit and vegetable market.

3.3 Public Buildings

There are no public buildings in the North End Section.

3.4 Recreation

The Brinton Brook Preserve, owned by the National Audubon Society, provides passive recreation opportunities through use of its trails. Spectacular views of the Hudson may be seen from this nature preserve high on the hills on the east side of Route 9A. There are also trails in use at the top of Prickly Pear Hill although these trails are located on private property.

3.5 Vacant and Disused

Several large tracts of open land and many smaller parcels are to be found in the North End section of the Croton-on-Hudson coastal zone area. These are the last large remaining open spaces in the Village. Most of this vacant land is situated on hilly terrain from which the Hudson River may be viewed.

These tracts of open land are all privately owned and plans for developing them are currently in various stages of consideration. The owner of a 260 acre tract, accessible from Prickly Pear Hill Road, Finney Farm Road and Fox Road, has submitted an application to create a golf course and country club. Under the existing zoning of RA-40, membership clubs are allowed if a special permit is granted by the Village Board of Trustees. A 60 acre tract of land just north of the proposed golf course has no active application at this time, but informal discussions about development of a residential subdivision have been held. These proposals, together with the ongoing construction of residences on the last remaining small parcels of land in this section, bring to a head certain issues and problems that demand the Village's attention.

Thirty-three acres of land at the very northernmost area in Croton, along Route 9A, owned by Baltic Estates, Inc., is also vacant. Fourteen acres of it to the south of Scenic Drive is zoned RA-25 for residential use. The remaining 19 acres, north of Scenic Drive and East of Route 9A, are zoned 0-3 for limited office use. Litigation challenging application of current zoning provisions to these parcels is pending.

A tract of land in the North End section that runs along the Village boundary line with the Town of Cortlandt is owned by Consolidated Edison. High tension lines from the Indian Point Nuclear Power plant run through this area and no development plans are being considered for this property at this time.

3.6 Analysis of Existing Land Use in the North End Section

Unlike the Hudson Riverfront section and the Center Village section, the North End section does not border directly on either the Hudson or Croton Rivers. In spite of this,

its hilly topography in conjunction with generally large lot sizes and substantial open spaces, give it incomparable visual access to the Hudson River.

The existence of some large areas of open land in this section has brought the same development pressures as in the other sections of the Village. Although the North End section shares the same problems and concerns as the other sections - traffic, water, visual access, environmental preservation, etc., the single major land use issue in the North End section is the fate of the last remaining large open spaces in the Village.

The hilly, wooded, rocky nature of land in this area, combined with the lack of connecting east-west streets, make traffic considerations important here. Route 9A (Albany Post Road), running on a north-south line through this section, is the single roadway to which all traffic from east-west streets must flow. Road capacity and safety must be considered when plans to increase the density of this area are examined.

Current zoning of most available land in the North End section is RA-40 (1 acre). One large tract of approximately 33 acres is zoned for commercial (RA 25) and limited office (O-3). This tract of open land is just south of the Scenic Ridge townhouse development and is owned by the same developer. Considerations for the development of this property as zoned will have to include all the normal environmental concerns as well as the problem of drawing additional traffic into the area from outside the Village. Development of this site will also have to address the potential problem of adding to the commercial and residential sprawl that is spreading into the Village along Route 9A from the north.

Many opportunities are present for the Village in the North End section. Its present low density use (except in the extreme north part) and remaining large tracts of open land, mean that opportunities for real decisions exist here. How and when the land in this section is eventually used will have an impact on the visual, environmental and economic character of the Village of Croton-on-Hudson and its coastal zone area.

B. HAZARDOUS WASTES

The Village of Croton-on-Hudson has two sites listed on the State's List of Inactive Hazardous Waste Sites or "Category 2" hazardous wastes sites. These sites include the 288 acre Croton Landfill within Croton Point Park, and the lagoon located on the Metro-North property, west of the railroad tracks.

The landfill has been closed since June 1986, however, the need for cleanup and closing of the site has not been resolved. Studies of the site are underway to examine leachate seepage and associated environmental degradation. In November 1988, Westchester County officials and New York State Department of Environmental Conservation resolved legal difficulties that have delayed progress towards cleanup and restoration of the landfill. The agreement, signed by both parties, would allow the County to collect 75 percent of the cost of restoration and closure of

the site from NYS Environmental Quality Bond Act money. The total cost of restoration at the time was estimated to be $24 million and take approximately five years. The County Board of Legislators and the State have now approved the agreement. However, final closure plans are at least a couple of years away and must await results of additional studies. In the meantime, signs have been posted on the perimeter of the site regarding its classification as an Inactive Hazardous Waste Site.

Currently there are three issues being addressed with respect to Croton Point Park and Landfill. The landfill site is under the authority of the Westchester County Department of Solid Waste. Plans for future use are being considered by that agency. The parkland is under the authority of the County Office of Parks and Recreation. The closure of the landfill is under the direction and supervision of NYSDEC and EPA and remediation is the subject of litigation and a negotiated settlement. A portion of such settlement was the dedication of 180 acres of Croton Point Park for use as an estuarine research center under the auspices of the Hudson River Fisherman's Association. The only role of the Village of Croton in the development of future land uses in the Park is an advisor to the Estuarine Research Center Committee. However, the Village is willing to participate as a member of any official body established for determining the future plans for Croton Point Park, including clean-up measures.

The Metro-North Lagoon has been used in the past as a dumping area for railroad-related wastes, including high amounts of PCBs and other ground contaminants.

In both the above cases, serious concerns have been raised about the levels of contamination to be found at these sites and the degree to which their toxicity is affecting the surrounding area. These concerns include ground water contamination, identifying the toxic substances at the sites, the "life" of these substances, their presences in runoff into the Hudson River and Croton River and Bay, soil contamination, their effect on fish and wildlife in the area, their release into the air, and their long term effects on residents living near these sites.

The conditions of the Croton landfill and at the toxic lagoon on the Metro North property present very difficult problems for Croton-on-Hudson and have a significant bearing on the revitalization of the entire designated coastal zone area by detracting from Croton's ability to maximize its prized waterfront resources. Clean up operations and closing of the landfill will be performed by the County under the direction and supervision of the Federal government. At present the future useability of the land and the water quality at and near the Croton landfill are in question.

The County is considering various land use proposals for the site. The issue of concern for the Village is whether, because of the hazardous conditions of the landfill, there should be any development on the site. The goal of the Village is to participate in negotiations and discussions of the future use of the site and in the planning process. The Village of Croton-on-Hudson has no legal authority in the execution of the cleanup; and, yet, the landfill constitutes a substantial negative presence in the Village. Although the Village has zoned the land RA40, single family residence, which also allows agriculture and nurseries, municipal buildings, places

of worship and schools, medical facilities, utilities, membership clubs, non-profit historic and landmark sites open to the public, 180 acres of the County-owned Croton Point Park have been dedicated for use as an estuarine research center.

C. WATER QUALITY

Within the Village of Croton-on-Hudson there are no surface waters assigned an A classification under the State's Environmental Conservation Law (ECL). The best usage of Class A water is as a source of water supply for drinking, culinary or food processing purposes and any other usages.

Class B waters are suitable for primary contact recreation and any other uses except as a source of water supply for drinking, culinary or food processing purposes. The only Class B waters in the Village are near the northern border of the Village in the Hessian Hill area and are tributaries to the stream which runs parallel to Lounsbury Road and eventually into the Hudson River. The Croton River is also classified as Class B from the northern border of the Village to its mouth. The Hudson River within the boundaries of Croton is also Classified B.

The remaining three streams within the Village of Croton (one in the Prickly Pear Hill area, the second running parallel to Lounsbury Road, and the third running parallel to Beekman Street), all of which are tributaries to the Hudson River, were classified as Class D for the last several years, but are now Class C. Class C waters are suitable for fishing and fish propagation.

The Westchester County Department of Health currently tests the water quality of a number of surface water bodies within the County. These tests are being conducted to provide a database on acid rain parameters, as well as to assess the potential for use of these water sources for emergency water supply for the County. The six Cortlandt sites currently being tested by the DOH include: Marden Pond, Peterson Pond, Kaplan's Pond, Peekskill Hollow Brook, Lake Cortlandt and Lake Hollowbrook. According to the Westchester County Department of Health, Division of Water Quality, use of these sites for emergency water supply is not likely for some time.

It should be noted that swimming at the beach at Croton Point has been periodically prohibited by the Westchester County Board of Health due to high fecal coliform levels from inadequate sewage treatment and illegal disposal of wastes from boats. This last occurred in the summer of 1988. See also Policy 34 regarding the provision of pump-out facilities at new marinas.

D. WATER SUPPLY AND SEWER SERVICES

Water is supplied to most Village properties by a Village-owned water supply.

In an attempt to identify whether or not its water supply could support the demands of additional development, the Village retained Geraghty & Miller, Inc. to study the Village's water supply. The results of this study concluded that the Croton River is the predominant water source

pumped from the Village well fields, which are located in the Center Village section. Under normal, non-drought conditions, five high-capacity wells located at the existing Village well locations can provide 5.5 million gallons per day (mgd) of water on a continuing basis. Under normal conditions, five high-capacity wells that are more evenly distributed than the existing well locations can provide 6 mgd on a continuing basis. Under normal conditions, 3 wells (including one new high-capacity well in the upper part of the well field) can provide 5 mgd on a continuing basis and under severe drought conditions, assuming no flow in Croton River and no other sources of recharge of the aquifer, the well field has 41 days of water at a pumping rate of 1.3 mgd and 16 days of water at 2.6 mgd. Currently, the Village wells pump 1.0 to 1.25 mgd.

The study recommended taking two upper-field wells out of service and replacing them with one deep-diameter production well in the upper part of the well field. In drilling this new well, the report recommended penetrating the bedrock for future use of ground water resources. Installation of a higher capacity pump in one of the wells was also recommended to increase yield capacity. In addition, a water-level measuring program to monitor the impact of drawdown on the aquifer was recommended.

The Village is within the County's Ossining Sanitary Sewer District. The District serves the central and southern areas of the Village. According to the Village Engineer, there is sufficient capacity in the system to serve Village residents. Individual septic systems are primarily located in the North End section of the Village.

Storm water runoff presents an additional problem to the Village. Plans locating the Village storm sewers are currently unavailable. However, the Village recognizes the desirability of having these plans drawn up when it is financially feasible to do so.

Village water and sewer are not available in a substantial portion of the North End section. Water for the Scenic Ridge complex is presently supplied by the Montrose Water District by agreement with the Village of Croton-on-Hudson. Unlike the ground water supply used by the rest of the Village, this water is classified as corrosive. Any proposed development of the open land in this area will have to address the necessity of providing water and sewage disposal, as well as to assess the impact on existing water sources to ensure that there will be no resultant depletion or degradation of quality. The Village Department of Public Works is considering relocating the Village garage and maintenance supply yards to one site. Salt and other road maintenance material has leached into the Croton Bay from the garage maintenance supply yard location in the Village-owned area south of the parking area at the Croton Harmon Railroad Station. The Public Works Department has withdrawn its interest in County-owned land south of the Croton Park Bridge for the garage site. Consideration is now being given to the Georgia Pacific Building at the end of Municipal Place.

E. RECREATION

There are a number of recreational areas within the Village (See Figure 3), the largest and most notable is Croton Point Park.

Croton Point Park provides facilities for swimming, boating, picnicking and camping. A pool is available, but no beach swimming is allowed due to polluted waters. There are also fields which can be used for ball playing. For many years this park has been the site of the annual Clearwater Revival. In 1988, Clearwater discontinued use of the site for its annual festival because of the health dangers that are feared may be present as a result of the proximity of the site to the Croton landfill.

Two other recreational sites exist along the Hudson River waterfront, Senasqua Park, a Village-owned park used for boating and picnicking, and the Croton Yacht Club. Recreational facilities at Senasqua Park include picnic tables, benches, playground equipment, restrooms, mooring slips, and a small beach area. The Croton Yacht Club site is also Village-owned and is leased to the Yacht Club through the year 1992 for $1,800 per year plus 60 percent of the gross revenue from boat storage above the first $4,000. The dock at the Club is available to pedestrians for recreation and fishing use, although locked gates and signs inhibit public use.

There are some concerns among the current boat users at Senasqua Park and the Croton Yacht Club that there will be an incompatibility between the predominant sailboat use and the probable large motor boats to be used at Half Moon Bay. Motor boat channels as designated on the Half Moon Bay marina site plan may make it difficult for sailboats to come into and out of Senasqua Park. In addition, wakes and cross wakes from motor boats can have an adverse affect on the ability of sailboats to get out into the River and also on their mooring. The introduction of such a large marina into the waterfront area where none had existed before raises the need for specific local laws and/or zoning regulations to govern the situation.

At the north end of the Village, off Furnace Dock Road, is Brinton Brook Preserve, a 40 acre tract of land owned by the Audubon Society. Paths are available throughout the preserve for passive recreation purposes by the public. Although the area possesses a serene beauty, visitors to the site are few in number and garbage dumping on the paths and adjacent roadways inhibit its use and enjoyment.

The Pierre Van Cortlandt Manor, owned and operated by Historic Hudson Valley (formerly Sleepy Hollow Restorations) is located at the end of South Riverside Avenue. This property fronts directly on the Croton River and is the site of the historic Pierre Van Cortlandt manor house dating from the time of Dutch control over the Hudson Valley. Tours are conducted of the house and grounds by Historic Hudson Valley. Picnicking spots are available.

Further up the Croton River, at the point where it narrows, four small islands, including Paradise Island, are owned by the County of Westchester. These islands are available only for passive recreation purposes and are accessible only by boat via Croton Bay.

Even further up the Croton River is the Village-owned beach and picnic area known locally as Silver Lake. Although the beach is small and the picnic areas are not well maintained, in the late spring and early summer months when the Croton River is high and fast running, this is a very popular swimming area for Village residents. Often, by late July, however, the water level becomes too low for swimming. This swimming and picnic area is close to the main residential areas of the Village; and although at the base of the gorge the terrain is very steep, it is accessible to many residents. There is a trail that follows the edge of the River from Silver Lake to the northeast. The trail is currently a cleared path used by bicyclists, joggers and walkers. However, since it is also a mapped street, there have been proposals to pave the trail for use as an actual Village street. However, recent proposals for the trail include its designation as a PRE zone (see page III-4). Boat access to Silver Lake is precluded by strong water currents.

Several other small Village-owned parks are scattered throughout the center of the Village. Many have either playground equipment of a minor nature and/or a ball playing field. Two of the largest are the recreation fields behind Carrie E. Tompkins Elementary School and Dobbs Park on Maple Avenue. The ball fields behind the school are in heavy use year-round for baseball, soccer and little league games. Parking spaces at both the school fields and parks are in short supply.

A small park at the Duck Pond also has a ball field for little league games. In the past, when frozen in the winter, the pond has been used for ice skating by residents. In the warmer months, Duck Pond has been home to many resident ducks and geese. Due to siltation deposition from feeder streams and weed growth, dredging of the pond became necessary in 1986. Deposition of organic materials from the feeder streams continues to be a problem for the aquatic life in the pond. To improve the oxygen circulation and reduce plant growth, the Village has installed an aerator. Although over $100,000 has already been spent on the Pond, a continual maintenance program is necessary to ensure the pond remains a viable recreational resource for Village residents. There are also a number of trails at the top of Prickly Pear Hill. Public use of these trails are limited however, since this property is privately-owned. The Village will pursue the provision of easements throughout this private property for the public use of the trail system.

The Indian Point transmission line corridor is informally used for recreation, but its use is not encouraged by Con Edison.

F. PUBLIC ACCESS

Other than Croton Point Park, with access over a one-way bridge through the railroad yards, and Senasqua Park, with access either across the railroad track or through a one-way tunnel under the tracks, almost no public access is possible along the entire Hudson River shoreline within Croton's boundaries. The bridge to Croton Point Park is in disrepair and requires complete reconstruction. Estimates for the new construction range from $10 to $12 million. Metro North is responsible for the bridge structure and uprights, and the County is responsible for maintenance of the road surface.

The Half Moon Bay development will provide a public walkway which, when completed, will be a minimum of six feet of pavement and a minimum of eight feet of graded landscape and will extend north to Senasqua Park. An easement for the walkway was included in the approval process to ensure continued public access. Public access along the walkway will however, be constrained due to the narrowness of the walk, the number of spaces in the public parking lot, and the use of the area solely for passive recreation, mainly walking.

Public access to the Hudson River for boating activities is presently available at Senasqua Park, the Croton Yacht Club, and from a small, natural boat ramp at the end of the railroad parking lot into Croton Bay. Senasqua Park is available to Village residents for sailing boats, boat storage and picnicking. However, access to the park and parking space for boats, trailers and vehicles is extremely limited. Access to Senasqua Park is via the Route 9 south exit and then north on a narrow road through a one-lane tunnel. The tunnel is owned by Metro North and should be enlarged and painted, if possible. Access is also available by crossing the railroad tracks in front of the Croton Yacht Club, adjacent to Senasqua Park to the north. The Croton Yacht Club, located north of and adjacent to Senasqua Park, also provides boating access to the Hudson. The Yacht Club land is leased from the Village. The docks at the Croton Yacht Club are available to Croton residents for recreation and fishing, provided these uses do not interfere with the Yacht Club's use of the premises. However, public access is discouraged by the use of no trespassing signs on the Club's gates. A small, unimproved boat ramp into Croton Bay is located at the south end of the Croton-Harmon railroad parking lot. The gates in this area should continue to remain open.

Several acres of Village-owned open land in the Center Village exist along the Croton River and may provide for public access if improved. This is in addition to the park sites at Silver Lake and Black Rock. In its present undeveloped state, this land preserves the natural and scenic environment along the Croton River. It also provides the Village of Croton-on-Hudson with substantial opportunities for increasing public access and recreational opportunities along one of its waterfront boundaries. See Chapter A for a description of Black Rock.

No provisions for public access have been made concerning other Hudson River or Croton River properties. Any development proposals for these properties will be reviewed during the planning process and public access to the waterfront will be considered. Such access could be a condition for approval of a special permit use and a Multiple Development Use.

G. SCENIC QUALITY

Visual access to both the Hudson River and Croton River and Bay is possible mainly from the other sections of the Village which are generally on a higher elevation and from portions of Route 9. Within the Hudson Riverfront section itself, visual access to the Rivers and Bay is somewhat impaired by rock outcrops, railroad tracks, large and small railroad-related buildings and towers, and a large warehouse at Route 9 and Municipal Place. Not only is sighting of the Hudson River and Croton Bay impaired by the presence of the above mentioned structures, but their industrial nature and, in some cases, dirty and deteriorated facades, further impairs scenic

quality. There are however, specific areas along Route 9 where there are unparalleled views of the western shore of the Hudson and Croton Point.

Croton Point Park and Senasqua Park are the only public locations on the Hudson Riverfront section with spectacular views of the Hudson River, both north and south. However, getting to both parks is a visual nightmare requiring a trip either through a tunnel or across a dilapidated bridge, through unsightly railroad yards. Requests to Metro North to make improvements in all these areas have generally met with very few positive results. The Croton landfill in Croton Point Park is also an unsightly element in this area marring visual access to the Hudson River and constituting a possible health hazard to Park visitors and employees.

When approaching Croton-on-Hudson from the south on Route 9, the railroad tracks, station and yards are the dominant sight along the Hudson River. When entering Croton from the south while on a train, the sight that passengers see not only includes all the above mentioned, but also substantial debris along the railroad beds. The south end of the Croton Harmon station parking lot is used by the Village for temporary storage of road maintenance materials and has no organized layout. The presence of the railroad and its associated uses are expected to continue in the future. However, many opportunities exist within this constraint for cleanup and screening.

Along South Riverside Avenue from Shop-Rite Plaza at the south end to its intersection with Route 129 to the north, the proliferation of commercial establishments has taken on a negative visual appearance. The great variety of buildings in this area have become, in many cases, shabby and dilapidated. Insufficient parking for customers and residents, exposed garbage containers, and countless cars in need of repair or being saved for parts all contribute to the unsightly appearance of this area. The Village does have a junkyard law and the provisions of this law are enforced by the Village Code Enforcement Officer.

Many property owners living on the high land that runs along South Riverside Avenue starting just south of the Duck Pond at Bungalow Road and running south have a wonderful view of the Hudson River. Although they have to also look at railroad tracks, the Harmon yards and the Shop-Rite Plaza, the view is still spectacular.

Along North Riverside Avenue and on the bluffs above North Riverside Avenue there are also many homes whose views of the Hudson River are equally spectacular.

Along Route 9, the major inland focus are the wooded hills of the North End section. While a number of homes already exist in this area, mainly on one or more acres, the wooded nature of the hills to a large extent conceals their presence. On the other hand, entering Croton from the north on Route 9 or Route 9A, the view of the Amberlands apartment complex (just outside of the Village) followed immediately by the Scenic Ridge townhouse complex is an overwhelming sight. One must first pass these very high density developments to reach the hilly wooded areas seen so readily from the south.

H. DEVELOPMENT CONSTRAINTS

The coastal zone area is characterized by varied topography and environmental constraints. The Development Constraints Figure (Figure 6) identifies those areas in the Village that are environmentally sensitive, such as State-designated wetlands and State classified Significant Habitats. The following text describes the significant habitats, geology, floodplain and wetland areas of the Village.

1.0 Significant Fish and Wildlife Habitats

Croton River and Bay and Haverstraw Bay, both bordering the Village, are areas identified by NYSDEC and NYSDOS as Significant Fish and Wildlife Habitats. Full descriptions and maps of the Habitats are appended to Section II of this LWRP.

1.1 Croton River and Bay

1.11 Habitat Description:

The Croton River and Bay fish and wildlife habitat includes an approximate one mile segment of the river (within tidal reach of the Hudson) and an approximate 1,200 acre shallow bay and mudflat area south of Croton Point. The bay contains extensive beds of submergent aquatic vegetation. The Croton River is a relatively large, warmwater stream, with a drainage area of over 375 square miles, and an average annual discharge volume in excess of 500 cubic feet per second. During periods of State-declared drought emergency, the freshwater flow can be diverted out of the Croton River for municipal water supplies to a maintenance level in the Croton River of 12 inches. Therefore, the tidal portion of the Croton River is included in the habitat. In addition to flow diversions, Croton River and Bay have been subject to considerable habitat disturbance, including filling of wetlands for waste disposal at the Croton Point Landfill, discharges of stormwater runoff, industrial and residential development, and the presence of road and railroad crossings.

1.12 Fish and Wildlife Values:

Croton River and Bay comprise one of the largest shallow bay areas in the lower Hudson River sheltered from strong currents, and to some extent, from prevailing winds. Although no unusual concentrations of any fish or wildlife have been documented in Croton River and Bay, it is a productive year-round habitat for resident fish species, such as largemouth bass, brown bullhead, carp, and panfish, and serves as a resting, foraging, and nursery area for anadromous species. As a result of the abundant fisheries resources and accessibility of the area, Croton River and Bay is very popular for recreational fishing; it is one of the recognized "hot spots" for striped bass in the Hudson River. In addition, these fish populations may be important for osprey, a NYS threatened species, during migration. Locally significant numbers of waterfowl occur in the area during spring (March - April) and fall (September - November) migrations.

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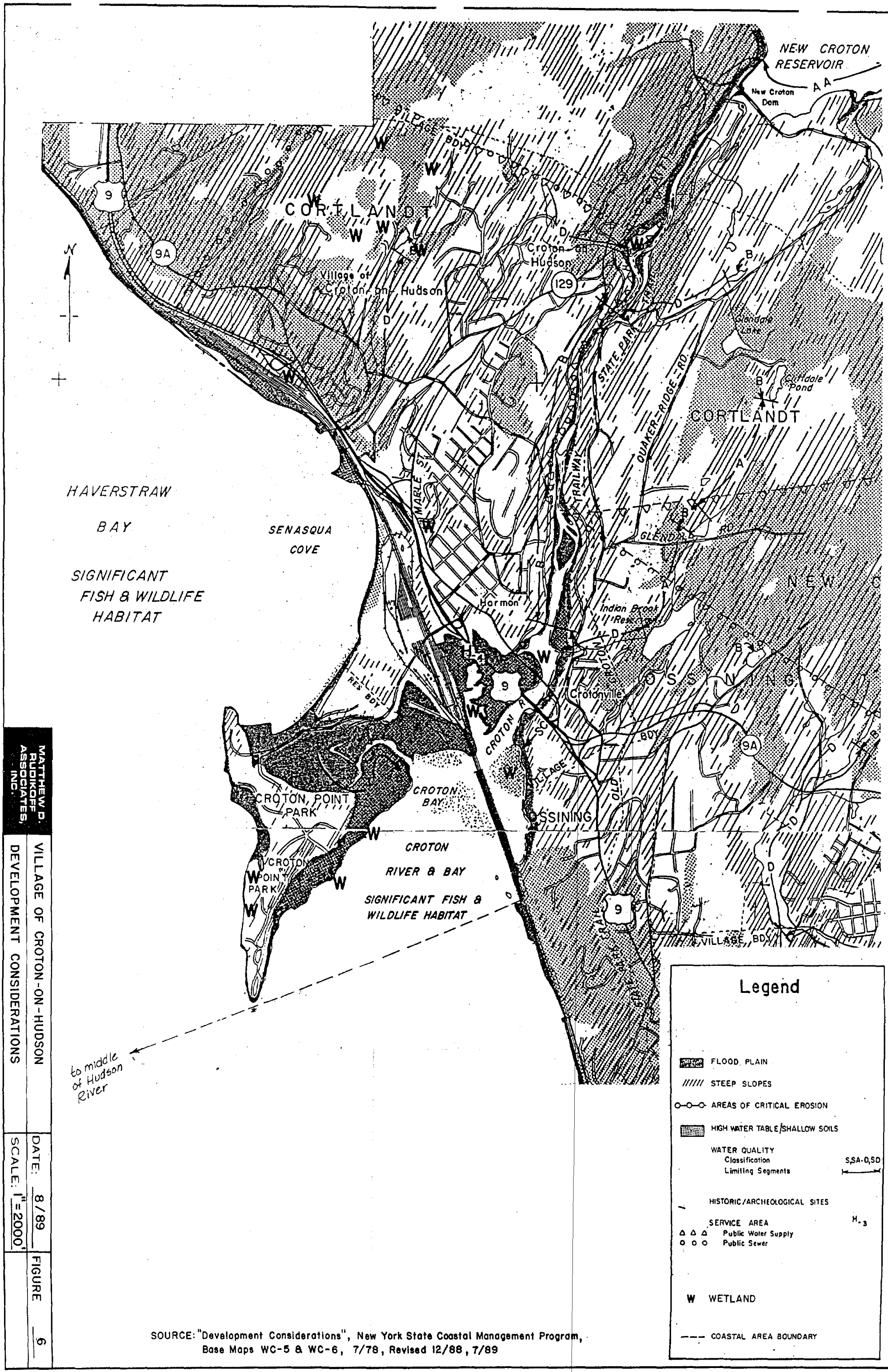

SOURCE: "Development Considerations", New York State Coastal Management Program, Base Maps WC-5 & WC-6, 7/78, Revised 12/88, 7/89

MATTHEW D. RUDIKOFF ASSOCIATES, INC.

VILLAGE OF CROTON-ON-HUDSON

DEVELOPMENT CONSIDERATIONS

DATE: 8/89

SCALE: 1" = 2000'

FIGURE 6

There is a popular trout fishery in the Croton River downstream of the New Croton Reservoir that NYSDEC stocks annually, as a policy, with 850 rainbow and 250 brook trout yearlings. Part of the stock has reached the New Croton Reservoir Dam downstream 1.0 miles, within the Village of Croton-on-Hudson.

1.2 Haverstraw Bay

1.21 Habitat Description:

The Haverstraw Bay fish and wildlife habitat encompasses the entire River over an approximate six mile reach, in the widest section of the Hudson estuary. Haverstraw Bay has extensive shallow water areas which deepen to a dredged navigation channel in the western half of the bay. During much of the year, Haverstraw Bay is a place where freshwater from the upper River mixes with salt water from the Atlantic, producing a predominantly brackish water habitat. Habitat disturbances, such as dredging, filling, bulkheading, waste disposal, and pollution from upland and in-river sources, have all been significant at some time during the recent history of this area.

1.22 Fish and Wildlife Values:

Despite various disturbances, Haverstraw Bay is one of the most important fish and wildlife habitats in the Hudson River estuary. Haverstraw Bay regularly comprises a substantial part of the nursery area for striped bass, tomcod, and Atlantic sturgeon that are produced in the Hudson. Other anadromous species, such as American shad, blueback herring, and alewife, spawn in upstream freshwater areas, but move south and feed in this area before leaving the River in the fall. Haverstraw Bay is also an important nursery and feeding area within the Hudson for certain marine species, most notably bay anchovy, Atlantic menhaden, bluefish, weakfish, and blue claw crab. Depending on location of the salt front, a majority of the spawning and juvenile Atlantic sturgeon wintering in the Hudson may reside in Haverstraw Bay. A portion of the shortnose sturgeon population, a Federal endangered species, also winters in this area.

2.0 Geology

Croton is located in an area that is part of a regional basement (or bedrock) complex called the Manhattan prong. This series of metamorphic rocks extends from the Peekskill area to the southern tip of Manhattan. The complex is bounded on the west by the Hudson River, and associates with the Taconic Prong to the east. The Manhattan Prong and the Taconic Prong are segments of the Appalachian Highlands.

Croton Point is a glacial-alluvial feature formed by the deposition of sediments where local glacial streams dropped their sediments when entering the Pleistocene (or ice age) feature known as Lake Hudson.

The age of the sedimentary rocks that became the Manhattan Prong is approximately 480 million years. The metamorphic events that formed the Manhattan series (and there is still discussion regarding how many metamorphic events occurred), have been dated by isotope studies of the Manhattan Schist to have occurred 360 million years ago.

Over the 360 million years since the formation of the Manhattan series, many events of deposition and erosion have occurred. Each of these cycles require many millions of years, and, at various times, the current bedrock surface has been exposed, subject to further erosion, and once again subject to deposition. The geologic history of the area is documented quite well, and as orogenic events caused the land masses to rise and fall, the Manhattan series was many hundreds of feet below younger rock formations at the bottom of the ocean, only to have the continental margin upthrust again, re-eroded, become part of an ancient coastal plain, lifted and eroded again, and eventually be sculpted into its current configuration.

The fracture systems and faults have played an important role in the morphology of this region, since these features, due to their fracture zones and generally weakened lithic structures become paths of least resistance for down cutting streams. Though the fault systems displayed on the map plate seem extensive, the majority of smaller faults are not shown. The geology of many of the smaller streambeds in Croton, such as the one north of High Street, and the one south of Prickly Pear Road (though both beds have been altered by human activity), probably follow small fault structures in the same manner that the Hudson and Croton Rivers follow larger ones.

Though Westchester has been subjected to only minor earthquake incidents in recorded history, this might not be the case in the future. Over the last few decades, attention has been drawn to the west coast, where the edges of the North American continental, and the Pacific oceanic plates are grinding past each other along the San Andreas fault. This attention is due to the earthquakes and the associated destruction that have occurred, and from the scientific perspective, due to the clear model that the San Andreas provides in support of the theory of plat tectonics. In the case of the Atlantic coast, earthquake activity has been minimal, since most movement has been at the mid-Atlantic ridge. The North American coastal plate is moving westward with half of the Atlantic oceanic plate as the ridge expands, slowly widening the Atlantic Ocean, in the same manner that the Pacific is narrowing. Therefore, the continental plate boundary is not the location of movement on the east coast.

At a symposium on earthquakes and construction given by the New York Academy of Sciences during March, 1988, the potential for east coast earthquakes was discussed in depth. Companies that build tank farms, refineries, pipelines and other complex

structures that would be damaged by earthquakes, must build their facilities to current earthquake standards, which, on the east coast, are still less stringent than on the west coast. However, the two worst earthquakes in recorded American history occurred in Missouri and in the Appalachians (which contain the Manhattan prong). Current thinking suggests that due to the fault structure in the region, it might be wise to upgrade earthquake structural requirements.

The Hudson River is estimated to have found its current channel approximately 10-15 million years ago. It is believed that the three major area fault systems, and the location of weaker more easily eroded rock systems and fracture zones facilitated the development of the Hudson's channel during that period. As the continental land mass rose, the water had to cut deeper to achieve sea level. Since water always follows the easiest course, the features mentioned allowed the flowing river to quickly establish and down cut its channel.

Over the last 1.5 million years, a series of glacial events brought the Croton area to its current configuration, including formalizing the Hudson's current course and Croton Point. While most people believe that there was only one glacier, there were four periods of glaciation during the Pleistocene period, and each period entailed numerous advances and retreats of the continental ice sheets. In fact, there is some evidence that our current era is still in the retreat phase of an inter-glacial period. Some authorities believe that in the near future (geologic near future, that is), the continental ice sheets will again advance.

Glaciers act like giant bulldozers, sculpting and gouging surface features and bedrock with cycles of advance and retreat, and remove, transport, and deposit vast quantities of eroded material. The most recent period of glaciation, the Wisconsonian, vacated the Croton area 12-15,000 years ago. During glacial advances, sea level was 350-400 feet lower than it is today due to the water contained in the ice sheets. This lowering of sea level naturally led to accelerated down cutting by streams and other watercourses. Glacial melt water was always leaving the foot of the glacier, and the glacier acted as the head, or source, of many streams, some of which have survived in the Croton area. When glaciers retreat they usually leave moraines, or piled up sediments behind. Moraines are sediment pushed forward by the ice sheet and left in place when the glacier retreats. As water flows through the moraine, sediments are carried by the water and sorted, or deposited due to size and mass.

After glacial retreat, the huge quantities of melt waters form vast lakes. The Great Lakes are surviving examples of this activity. One, Lake Hudson, was the swollen lower reaches of the Hudson River. Sediments found on Croton Point indicate that the Point existed as a glacial delta, formed by runoff from the glacial streams dumping their sediment as they entered Lake Hudson. The sediments also indicate that Lake Hudson's water level was approximately 100 feet higher than the water level of the current Hudson River.

2.1 Morphology

Essentially, the majority of Croton slopes downward from the Prickly Pear, Mt. Green, and Mt. Airy complexes towards the Hudson and Croton Rivers. The topography also slopes down from these peaks in an easterly direction, but that portion lies essentially out of the Village boundaries.

The Village's high points, and the majority of exposed Croton bedrock, is Manhattan Schist. As discussed previously, the Manhattan Schist and the Fordham Gneiss are closely related species, and both products of dynamic metamorphism. Though they are very similar mineralogically, the gneiss is more highly metamorphosed than the schist. Both rocks contain mica, feldspar, and quartz, and these minerals all can be observed in the structure with the naked eye or with a small lens. The schist, due to the large quantities of mica present has a "glittery" appearance on a fresh surface, and is the material most of the stone walls in the area are constructed of. The silvery color of the schist is diagnostic, and upon close examination, seems to be foliated or layered. This layering is a result of the mica, which is a flat silicate mineral aligning in parallel planes during metamorphosis. On closer examination, many garnets can be seen on a fresh surface. The schist sometimes has a reddish appearance due to the oxidation of the iron in the garnets. Outcrops of schist can be seen throughout the Village, and can easily be identified from a passing car.

Often, small areas of gneiss can be seen on outcrops of schist. The gneiss appears as a layer cake pattern with alternating bands of dark and light. The separation of the light and dark minerals is a result of a higher level of metamorphism. When the gneiss-like pattern is seen on a schist boulder or outcrop, it is usually due to higher temperatures and pressures in that localized region during formation. When seen on schist outcrops, the bands are often highly folded, again, due to the pressures of the metamorphism. Massive gneiss outcrops are not as common as the schist in the Village, though there is an outcrop on Prickly Pear Hill. The outcrops are often highly fractured as a result of faulting or fracturing. Outcrops in Croton Gorge display some intrusions, and the outcrop downslope from the entrance to the Croton Gorge Park on Route 129 has a very clear vein of intrusive quartzite exposed.

The Inwood Marble is much in evidence in the Village, and comprises the low or flatter areas. The marble is the material that the inmates used to break with sledge hammers at Sing Penitentiary in Ossining. In fact, most of the 19th century buildings at Sing were built in Inwood Marble. The marble is composed of calcite and dolomite that has been metamorphized. A fresh surface of the marble presents a white, sometimes slightly grayish, crystalline surface. An excellent outcrop of the marble can be found at the intersection of Grand Street and Route 129 in the Village. The marble is much more susceptible to erosion than the schist or gneiss, and is usually the bedrock underlying valleys and flatter areas. The depth of soil over the marble tends to be greater than over the schist and gneiss.

In general, depth to bedrock tends to increase as one goes downslope, leading to the alluvial deposits that form the banks of the Hudson and Croton Rivers. When examining the Croton River, it must be remembered that the channel south of the Croton dam is much smaller than when the River flowed freely. Also, due to the collapse of the original dam during construction in the mid-nineteenth century, many thousands of tons of in-place sediment were dragged from the river channel to the mouth of the river.

During the short violent period after the dam failed, the dammed water broke free of restraint, taking sediment, trees, and houses downstream. When the waters lost their energy in the Croton estuary and dumped the debris, the lower Croton was barred from ever carrying river traffic again. The sandbars clearly visible from the railroad tracks west and south of the railroad bridge are evidence of this event. Also, when the water is low, the trees dragged down with the rushing waters are still visible in Croton Bay, where they've rested for over 130 years.

Aside from these features, almost all other visible components are glacial in origin. Glacial erratics, or boulders left in place as the glacier melted, are all over the Village. Most of the erratics are local in origin since they are mostly schist or gneiss. There are some erratics of granite that were dragged from the New England uplands and left by the glaciers. Glacial striations or drag marks are clearly visible cut into the schist outcrops on Prickly Pear Hill and other locations. These striae were formed as the foot of the glacier moved over the bedrock on top of the hill, and cut the lines with the sediments frozen into the bottom of the ice sheet.

Remains of glacial kettles, kettle ponds, and eskers are present in the Croton area. A kettle forms when a large block of ice is left behind by the glacier, and slowly melts, forming a large depression in the ground. If conditions are favorable to recharge the melt water with ground water, a pond remains. Eskers were streams of running water at the bottom on the glacier. When the glacier melts, only the esker's sediment remains as a low snakelike ridge.

Due to irregularity of the bedrock, the soil cover in the Village runs from almost non-existent on tops of the hills to deep at the bottoms. Since the bedrock is irregular on the sloped surfaces, soil depths cannot be generalized. Without taking soil borings, trees can often be used as indicators of depth of soil. On steep slopes where few trees exist, obviously there is not sufficient soil to support them. Often the tree roots extend above the soil indicating that while there was sufficient cover for the tree's original tap roots, insufficient soil exists to allow all roots sufficient burial.

Most of Croton's soils are glacial in nature, and are based on either till (soil containing rocks and pebbles of irregular size), finely sorted (pebbles and stones of regular size), or fine outwash sands. Layered outwash sands can be seen in the cut at the corner of Riverside Avenue and Brook Street. Due to construction, the hillside on the north side of the street was excavated to create room to park construction equipment. In the face

of the cut can be seen till, and also very fine layered sands, representing seasonal cycles during the glacial period. Soil and sand deposits of this type are typical of the Village's lower elevations. The shoreline of the Hudson River is a mixture of glacial soils, alluvial deposits, and organic materials. As mentioned, Croton Point contains evidence of a glacial delta. This material was found in core samples from the undisturbed section of the Point. In general, the geology and soils of the Point are beyond analysis, due to the massive dumping and other disruptive activities that have occurred there since the early 20th century.

Since the bedrock in Croton is irregular, trees and ground covering plants are critical for slope stabilization. Croton is on the move, and is moving gradually downslope towards the Hudson River. Sidewalks, retaining walls, and railroad tie walls all over the Village are also on the move, and cracks and gaps are the result of "slumping", a common event on unstable slopes. Many of the Village's roads become roller coaster landscapes in the late winter and early spring as freeze/thaw cycles cause frost heaving. Frost heaving is caused when ground water trapped close to the surface between the road surface and the bedrock freezes, forcing the pavement to rise or fall.

2.2 Soils

Soils are differentiated by groups and associations. Each soil type is named and given a diagnostic description. Nature rarely follows specific descriptions, so depending on the soil, it may best be described by a combination of names.

For the purposes of this report, only the main soil groups and their associations have been referenced. Soil groups are distinguished by clay content, drainage, extent of the horizons (layers) conductivity, percolation rates, and other data. Most of northern Westchester's soils share the same basic affiliations, and as previously explained, this is due to similar bedrock structure and glacial activity.

Also, some of the soil map numbers refer to more than one association, and the proper association can only be chosen by on site examination. The soil map associations of non-conforming groups are usually irregular in shape and very small in area. These factors make a complete narrative description of the Village's soil structure an impossible task.

In general, the major soil associations in the Village are:

HINCKLEY SERIES - #'s 101, 141
Deep, excessively drained soils on terraces, outwash plains, deltas, eskers, and other glacial associations. Usually dark loamy sand with lower horizons composed of stratified sand and gravel.

CHARLTON SERIES - #'s 22, 63-75-70, 110-120
Very deep, well drained upland soils formed in glacial till derived from schist and gneiss. Very stony loam surface. Lower horizons are stratified friable sandy loam.

CHATFIELD SERIES - #'s 70-71, 120-130
Moderately deep, excessively drained upland soils. Usually formed in glacial till, dark brown loamy surface, and lighter loamy lower horizons.

CARLISLE SERIES - #'s 101, 105
Very deep, poorly drained, formed in woody areas, bogs, wetlands, and other depressional features. Glacially associated, surface is black muck, lower horizons are brown muck.

SUN SERIES - #'s 25, 27, 101, 141
Deep, poorly drained upland soils formed in glacial till. Usually dark loam surface, lower horizons mottled gravelly sandy loam.

HOLLIS SERIES - #'s 71, 130
Shallow, well to excessively drained upland soils. Thin gray/brown surface layer, lower horizon usually till directly overlying schist and gneiss bedrock.

PALME SERIES - #'s 102, 103 104, 105
Very poorly drained soils formed in moraines, till plains, and other terminal glacial features. Black muck overlying gray loam. Usually found in wetland areas.

SUTTON SERIES - #'s 68, 104
Deep, moderately well drained soils on uplands, formed in glacial till. Generally dark sandy loam surface, lower horizons lighter sand or gravelly loam.

POMPTON SERIES - #'s 140
Deep, moderately well drained coarse soils of uplands and outwash plains. Very fine sandy loam surface, lower horizons gravelly sandy loam.

As stated, these are the major groups. How they are interpreted and how they are assigned must also be taken into context with topographic slope. In an area like Croton where slope is a major consideration, many of these soil groups become unstable as slope increases. To determine the soil and conditions on a particular location, slope data must be interpreted along with the soil horizon to determine how well suited a particular site is for drainage, foundations, septic systems, etc. This information is discussed for each soil group on the data sheets. If a particular location is best described by more than one soil group, actual tests as described previously may be required to establish the association that is closest, and then the remaining data may be interpreted for the intended use.

In general, the Village is composed of upland associations, glacial outwash, and organic materials along the Hudson River shoreline. From north to south, the Hudson River waterfront is a combination of Palme/Carlisle/Sun with Sutton and Hinckley associations. The Croton River bank areas are mostly Charlton associations up to the dam, though the south side of the Croton has different soil groups.

The highly developed lower Village area is almost exclusively Pompton, with Charlton and Palme associations.

The upper Village, Prickly Pear, etc., are almost all Charlton, with some Sun and Chatfield associations.

3.0 Floodplain

The areas adjacent to Croton River and Bay and along the shoreline of the Hudson River are considered to be within floodplain areas of the Village. These low-lying areas adjacent to water bodies are at the lowest elevation within the Village. The floodplain is considered to contain the land nine feet above the elevation of the Hudson River.

4.0 Wetland

Wetland areas within the Village are located along Croton Bay, in the tidal flats, and in a few areas in the northeast section of the Village. See Figure 6 for wetland locations. Wetlands designated by the Department of Environmental Conservation are H-3, H-4, H-5, H-6. All are upper marsh and are located within the Croton River and Bay Significant Coastal Fish and Wildlife Habitat (See Section # 1.1) for a description.

I. HISTORIC RESOURCES

The Village of Croton-on-Hudson has a long and colorful history. When Henry Hudson sailed up the river which now bears his name in 1609, he passed one of the principal villages of the Kitchawane Indians on Croton Point, or Senasqua as they called it, where the Kitchawanes often gathered to perform ceremonial dances and bury their dead.

In 1677 Stephanis Van Cortlandt, the son of a wealthy Dutch merchant and the first native born mayor of New York City, was granted a license to create a manor which grew to stretch from the Hudson to the Connecticut border. A trading post was established at the mouth of the Croton River which is presently part of the Van Cortlandt Manor house. The Village of Croton was part of the vast Van Cortlandt Manor estate, and was originally known as Croton Landing. The riverfront was the main focus of activity in the region, and the Landing was used by farmers and merchants to transport their goods to New York for sale.

Croton was involved in numerous battles and skirmishes during the Revolutionary War, and Ben Franklin stopped at the Van Cortlandt Manor in 1776 on his journey to Canada in search of an ally. One especially notable incident occurred in September of 1780 when the British sloop Vulture lay at anchor off Croton Point awaiting British Major John Andre. Andre was ashore meeting with the infamous American General Benedict Arnold, and the two were conspiring for the surrender of West Point, which Arnold commanded and which was the key to the American military position in the Central Hudson.

While Andre and Arnold were meeting, patriots from the post in Verplank brought a cannon to Croton Point and fired on the Vulture. The ship sustained considerable damage and when the tide rose moved down river. Major Andre was forced to seek escape on land and was captured in Tarrytown two days later, foiling the plans to capture West Point.

After the Revolutionary War, the linking of local roads created a continuous roadway from New York City to Albany. Weekly stage coach service was established on the Albany Post Road in 1784. The ferry house at Van Cortlandt Manor provided refreshment and lodging for stagecoach travelers, as well as a meeting place for local residents.

During the nineteenth century, farming, shipping, and making flour and bricks were Croton's principal industries. In the early days there was a flour mill and a wire mill on the Croton River and a brickyard on the Hudson. By 1849 two railroad tracks had been laid through the middle of the business section along the Hudson. An 1860 map shows 3 brickyards, 3 general stores, 3 churches, a school house, a post office, and about 65 dwellings located mostly along what are now Riverside Avenue, Brook Street, Grand Street and Old Post Road. The area was incorporated as the Village of Croton-on-Hudson in 1898.

The need for a clean and reliable water supply for the growing City of New York led to the construction of the Croton Aqueduct and the first Croton Dam in 1841. The original earth and masonry dam was almost finished when a heavy snow and rainfall caused it to give way on January 7, 1841. The resulting flood took with it everything in its path and left silt which closed the mouth of the Croton River for shipping forever. The present Croton Dam, built of stone, was completed in January of 1907. All over Croton one can find homes, churches, and foundations built with stone from the excavation done in connection with the Dam's construction.

Croton's life as a railroad town dates from 1913, when the Harmon yards and shops were put into operation. The principal reason for the selection of the Croton Point by the New York Central Railroad as the site of its new steam engine terminal and rail yards appears to have been the availability of land. Most of the site was purchased from Clifford Harmon, a real estate developer who stipulated in the deed that the station at the point where engines were to be changed would always bear his name. Harmon then chartered special trains from New York to Croton for prospective lot purchasers. He wished to develop the present Harmon area as a "complete community of rural charm" for artists, writers and musicians. His efforts were not completely successful, but Harmon did become a quiet residential section of one family houses owned by people who worked on the railroad or commuted to jobs in New York. The growth of the Harmon development after World War II led to its annexation to Croton in 1931, the same time at which the Mt. Airy section became a part of the Village.

During the period that Harmon was being developed, a group of people began coming to the Mt. Airy section who were radical in their political thinking and free in their lifestyles. Many were writers, editors and artists, and for a time Mt. Airy became a place to spend weekends from some of the bohemian residents of Greenwich Village.

On Croton Point, a small community developed around a brickyard which operated until 1915 when supply of clay was exhausted. Judge Decker of Croton leased the beach area around 1900 and started the Croton Point Club. Bungalows were built for use in summer. In May of 1923 the Hudson River Development Club opened Croton Point Park which featured dancing, swimming and other amusements. In 1924 the Westchester Park Commission bought 500 acres on Croton Point, 70 of which were set aside for a dump.

All of the particulars of Croton's history are too numerous to detail here. Some of the other highlights of the historic resources of Croton include the presence of the famous Nikko Inn, a weekend rendezvous of early film stars; Stevenson Estates, originally a "retreat" for well known actresses and heiresses; the Bethel Chapel, built in 1780 and restored in 1936, in whose cemetery can be found the graves of several Indians and Revolutionary soldiers; and the quaint residences and remains of a concrete barn on Finney Farm, which was originally a quarantine station for imported cattle and a place to test new farm implements and techniques.

There are two designated historic sites in the Village of Croton-on-Hudson. Sites listed on the National or State Registers of Historic Places are guaranteed certain protections under National and State Historic Preservation Acts, respectively. All actions within immediate vicinity of historic sites are considered Type 1 actions under the State Environmental Quality Review Act.

The two historic sites within the Village that are listed on the National Register include the Pierre Van Cortlandt Manor House and the Croton North Railroad Station.

J. HIGHWAYS/ROADS/MASS TRANSPORTATION

State Routes 9 and 9A are north-south travel corridors which pass through the Village of Croton-on-Hudson. While Route 9 is a four-lane highway with limited access, Route 9A is more of a minor arterial with numerous driveways and intersecting local roads. Roadways such as Route 129, Old Post Road and Grand Street collect traffic from local streets in Croton's residential neighborhoods and channel it into arterials.

Unlike other sections of Westchester County, the northwest area of the County in which Croton is located is not served by a major north-south or east-west interstate highway such as I-684 or I-287 and does not have the same level or intensity of development that has occurred along portions of these interstates. However, increased housing construction and density in northern Westchester, along with commercial real estate development in other areas of the County is nonetheless causing a significant dilemma with regard to the adequacy of existing transportation facilities.

In 1987, the Westchester Department of Planning issued a regional report on the development potential and traffic analysis of the Route 9/9A corridor. This report cited a January 1986 Department of Planning estimate that the population of the northern county grew by a factor of 8.3 percent between 1980 and 1986. The countywide rate of population increase, on the other hand, was only 2.3 percent during the same period. From 1976 to 1986, the average increase in traffic volumes in the Route 9/9A corridor was in the range of 30 percent.

The above-mentioned report also cited New York State Department of Transportation (DOT) reports showing that the greatest volume of traffic in this area was carried on the approximate one mile segment of roadway where Route 9 and Route 9A share the same alignment. This segment extends from immediately north of the Route 9/9A interchange in the Crotonville section of the Town of Ossining to the Route 9 interchange with Croton Point Avenue, the exit for the Croton Harmon Railroad Station. This stretch of road is just north of a section of Route 9A referred to as "Killer Hill" in Ossining- a 1.6 mile section of steep, curving incline where Route 9A joins Route 9 just before entering the Village of Croton. Since 1983 there have been more than 350 accidents along this section of roadway. In response, the DOT has completed planning, grading and alignment changes. Several traffic warning sign improvements have already been made, including a flashing warning sign at Stormytown Road. However, there are no plans or foreseeable means to increase the roads' capacity, and rush hour tie-ups engendered by both the steep grade and traffic signals further to the south on Routes 9 and 9A will continue to be a fact of life in this area for the indefinite future.

The Croton-Harmon train station, served by the Hudson Line of the Metro-North commuter railroad, provides direct public transportation to Grand Central Station in midtown Manhattan in under fifty minutes. The station building in Croton has undergone renovations which modernized and made it handicap accessible.

The typical rush hour train, to and from Croton, consists of six cars with a total seated capacity of 650-700 passengers. The daily number of New York City bound passengers boarding at the Croton-Harmon station is currently around 3,800 people, with about 2,750 boarding during the morning peak hours and the remainder using off-peak service.

Extensive commuter parking facilities at the station include a municipally owned paved lot and a privately owned unpaved lot. The municipally owned lot includes spaces for Village residents and non-residents with parking permits.

Total occupancy of the municipal parking lots is 100 percent. As of November 1991, there is a waiting list of approximately 125 people wishing to acquire non-resident permits and an additional waiting list to obtain monthly spaces in the private lot. Village residents are granted monthly parking permits as of right. Although Half Moon Bay residents will have access to the station via a shuttle bus provided by the development, it is difficult to predict how many residents will actually use it.

At the present time the Croton Department of Public Works garage is located within the confines of the train station. The Village is considering relocating the garage and road supplies to the Georgia Pacific Building at the end of Municipal Place.

The availability of station parking (which is in short supply throughout the northwest portion of Westchester County), the lack of rail service in the neighboring and growing Town of Yorktown, and the ease of its express transportation schedule combine to make Croton a regional rail transportation center. The presence of the Croton Harmon station contributes to the aforementioned traffic congestion on Routes 9 and 9A.

In addition, the traffic problem in the immediate area of the train station is exacerbated by the dilapidated Croton Point Bridge, which connects the Metro-North train yards and employee parking with Croton Point Avenue and over which traffic can travel only one direction at a time. A member of the Croton police force must be present at the entrance to the station each day during both morning and evening rush hours in order to regulate the flow of traffic into and out of the station, back and forth over the bridge, on and off Route 9 from the north and south, and out of the metered lot on the north side of Croton Point Avenue.

The Village is served by Westchester County buses on Route 9A, Croton Point Avenue, Riverside Avenue, Benedict Boulevard, Cleveland Drive, Old Post Road South, and Maple Avenue. These buses provide transportation through the City of Peekskill to Jefferson Valley (the location of a regional shopping center), Mount Kisco and White Plains, which is a major hub of the bus transportation system for the County. However, bus-to-bus and bus-to-train schedules are not always compatible, making transfers difficult and time-consuming. The County should review bus and train schedules and consider alternative routing and scheduling to facilitate the use of public transportation.

K. AIR QUALITY

The NYS Department of Environmental Conservation (NYSDEC) maintains air quality monitoring stations throughout the State. Westchester County is considered to be part of the Metropolitan Air Quality Control Region which also includes Rockland, Nassau and Suffolk Counties, as well as New York City. The monitoring stations closest to the Village of Croton are Ossining, Mamaroneck, Mt. Vernon, and White Plains. There are no monitoring stations in Rockland County, whose air quality would directly indicate conditions in Croton.

The recorded air quality levels for 1985-87 and applicable standards are shown on Table 1, on the next page. In order to get a more complete picture, it is necessary to look at the Metropolitan Region as a whole.

The following is a summary of 1987 data for the Region:

Recorded Air Quality Levels for 1985 - 1987

Parameter	Sites	No. of Sites In Compliance	No. of Sites Exceeding AAQS	Regional Average
Sulfur Dioxide	13	13	0	0.014 mg/m^3
Total Suspended Particulates	21	21	0	50.2 ug/m^3
Carbon Monoxide	7	3	4	2.8 ug/m^3
Ozone	6	0	6	0.022 mg/m^3
Nitrogen Dioxide	4	4	0	0.40 $mg.m^3$
Lead	7	7	0	0.08 ug/m^3

Thus, air quality in the region is in compliance with Ambient Air Quality standards except for the parameters of ozone and carbon monoxide. Exceedances can be attributed to motor vehicle traffic, particularly in Manhattan and Long Island locations.

According to NYSDEC, there are no point source emissions of concern to the Village of Croton-on-Hudson. However, certain conditions exist within the Village that can contribute to the degradation of the air quality. These conditions include idling automobile traffic at Village intersections, a major arterial highway that is often congested, a Superfund site (the County Landfill) that emits methane, another Superfund site (the Metro-North PCB Lagoon) and nearby storage tanks that volatilize and emit hydrocarbons and the location of the major switching station for Metro-North and Amtrak diesel trains. Emissions from these sources, coupled with the differences in elevation within the Village, and emissions from nearby power and garbage plants may result in an air quality problem. There is a need to establish a monitoring station within the Village to quantify these air quality concerns.

TABLE I
Air Quality Levels in Westchester County

PARAMETERS	1985	1986	1987	AAQS
Total Suspended Particulates (Annual Geometric Mean) -				
Mt. Vernon	44 mg/m^3	37 mg/m^3	40 mg/m^3	75 mg/m^3
Ossining	37 mg/m^3	34 mg/m^3	50 mg/m^3	65 mg/m^3
Lead (Annual Geometric Mean) -				
Mamaroneck	0.17 mg/m^3	0.09 mg/m^3	0.06 mg/m^3	1.5 mg/m^3
Ozone (One Hour Average) -				
White Plains			0.143 mg/m^3	0.12 mg/m^3

Source: New York State Air Quality Report - Ambient Air Monitoring System. NYS Department of Environmental Conservation, Division of Air, Annual Report 1987.

INVENTORY AND ANALYSIS
APPENDIX

Croton River and Bay Habitat
Haverstraw Bay Habitat

COASTAL FISH & WILDLIFE HABITAT RATING FORM

Name of Area: **Croton River and Bay**

Designated: **November 15, 1987**

County: **Westchester**

Town(s): **Cortlandt, Ossining**

7½' Quadrangle(s): **Haverstraw, NY; Ossining, NY**

Score	Criterion
12	Ecosystem Rarity (ER) A major tributary and sheltered bay of the lower Hudson River, but rarity reduced by human disturbance; geometric mean: $(9 \times 16)^{1/2} = 12$.
0	Species Vulnerability (SV) No endangered, threatened or special concern species reside in the area.
9	Human Use (HU) A popular recreational fishing area; one of the recognized "hot spots" for striped bass in the lower Hudson River.
0	Population Level (PL) No unusual concentrations of any fish or wildlife species occur in the area.
1.2	Replaceability (R) Irreplaceable.

SIGNIFICANCE VALUE = [(ER + SV + HU + PL) X R]

= 25

SIGNIFICANT COASTAL FISH AND WILDLIFE HABITATS PROGRAM
A PART OF THE NEW YORK COASTAL MANAGEMENT PROGRAM

BACKGROUND

New York State's Coastal Management Program (CMP) includes a total of 44 policies which are applicable to development and use proposals within or affecting the State's coastal area. Any activity that is subject to review under Federal or State laws, or under applicable local laws contained in an approved local waterfront revitalization program will be judged for its consistency with these policies.

Once a determination is made that the proposed action is subject to consistency review, a specific policy aimed at the protection of fish and wildlife resources of statewide significance applies. The specific policy statement is as follows: "Significant coastal fish and wildlife habitats will be protected, preserved, and, where practical, restored so as to maintain their viability as habitats." The New York State Department of Environmental Conservation (DEC) evaluates the significance of coastal fish and wildlife habitats, and following a recommendation from the DEC, the Department of State designates and maps specific areas. Although designated habitat areas are delineated on the coastal area map, the applicability of this policy does not depend on the specific location of the habitat, but on the determination that the proposed action is subject to consistency review.

Significant coastal fish and wildlife habitats are evaluated, designated and mapped under the authority of the Coastal Management Program's enabling legislation, the Waterfront Revitalization and Coastal Resources Act (Executive Law of New York, Article 42). These designations are subsequently incorporated in the Coastal Management Program under authority provided by the Federal Coastal Zone Management Act.

This narrative, along with its accompanying map, constitutes a record of the basis for this significant coastal fish and wildlife habitat's designation and provides specific information regarding the fish and wildlife resources that depend on this area. General information is also provided to assist in evaluating impacts of proposed activities on parameters which are essential to the habitat's values. This information is to be used in conjunction with the habitat impairment test found in the impact assessment section to determine whether the proposed activities are consistent with the significant coastal habitats policy.

DESIGNATED HABITAT: CROTON RIVER AND BAY

HABITAT DESCRIPTION:

Croton River and Bay is located on the east side of the Hudson River, in the Villages of Croton-on-Hudson and Ossining, in the Towns of Cortlandt and Ossining, Westchester County (7.5' Quadrangles: Haverstraw, N.Y.; and Ossining, N.Y.).

The fish and wildlife habitat includes an approximate one mile segment of the river (within tidal reach of the Hudson) and an approximate 1,200 acre shallow bay and mudflat area south of Croton Point. The bay contains extensive beds of submergent aquatic vegetation. The Croton River is a relatively large, warmwater stream, with a drainage area of over 375 square miles, and an average annual discharge volume in excess of 500 cubic feet per second. The entire freshwater flow, except for periods of spilling, is diverted out of the Croton River for municipal water supplies. Therefore, the tidal portion of the Croton River is included in the habitat.

In addition to flow diversions, Croton River and Bay have been subject to considerable habitat disturbance, including filling of wetlands for waste disposal, discharges of stormwater runoff, industrial and residential development, and the presence of road and railroad crossings.

FISH AND WILDLIFE VALUES:

Despite significant habitat alterations affecting the area, tidal portions of Croton River and Bay remain important as fish and wildlife habitats in the lower Hudson Valley. Croton River and Bay comprise one of the largest shallow bay areas in the lower river that is sheltered from strong river currents, and to some extent, from prevailing winds. Consequently the area provides favorable habitat conditions for a variety of anadromous and resident warmwater fish species. Use of the area by anadromous species, such as alewife and blueback herring, may be significantly increased if minimum flow requirements were established for the Croton River. Although no unusual concentrations of any fish or wildlife have been documented in Croton River and Bay, it is a productive year-round habitat for resident fish species, such as largemouth bass, brown bullhead, carp, and panfish, and serves as a resting, foraging, and nursery area for anadromous species. As a result of the abundant fisheries resources and accessibility of the area, Croton River and Bay is very popular for recreational fishing; it is one of the recognized "hot spots" for striped bass in the Hudson River.

In addition, these fish populations may be important for osprey (T) during migration. Locally significant numbers of waterfowl may also occur in the area during spring (March - April) and fall (September - November) migrations, but the extent of this use is not well documented.

IMPACT ASSESSMENT:

A **habitat impairment test** must be met for any activity that is subject to consistency review under federal and State laws, or under applicable local laws contained in an approved local waterfront revitalization program. If the proposed action is subject to consistency review, then the habitat protection policy applies, whether the proposed action is to occur within or outside the designated area.

The specific **habitat impairment test** that must be met is as follows.

> In order to protect and preserve a significant habitat, land and water uses or development shall not be undertaken if such actions would:
>
> destroy the habitat; or,
>
> significantly impair the viability of a habitat.

Habitat destruction is defined as the loss of fish or wildlife use through direct physical alteration, disturbance, or pollution of a designated area or through the indirect effects of these actions on a designated area. Habitat destruction may be indicated by changes in vegetation, substrate, or hydrology, or increases in runoff, erosion, sedimentation, or pollutants.

Significant impairment is defined as reduction in vital resources (e.g., food, shelter, living space) or change in environmental conditions (e.g., temperature, substrate, salinity) beyond the tolerance range of an organism. Indicators of a significantly impaired habitat focus on ecological alterations and may include but are not limited to reduced carrying capacity, changes in community structure (food chain relationships, species diversity), reduced productivity and/or increased incidence of disease and mortality.

The tolerance range of an organism is not defined as the physiological range of conditions beyond which a species will not survive at all, but as the ecological range of conditions that supports the species population or has the potential to support a restored population, where practical. Either the loss of individuals through an increase in emigration or an increase in death rate indicates that the tolerance range of an organism has been exceeded. An abrupt increase in death rate may occur as an environmental factor falls beyond a tolerance limit (a range has both upper and lower limits). Many environmental factors, however, do not have a sharply defined tolerance limit, but produce increasing emigration or death rates with increasing departure from conditions that are optimal for the species.

The range of parameters which should be considered in appplying the habitat impairment test include but are not limited to the following:

1. physical parameters such as living space, circulation, flushing rates, tidal amplitude, turbidity, water temperature, depth (including loss of littoral zone), morphology, substrate type, vegetation, structure, erosion and sedimentation rates;

2. biological parameters such as community structure, food chain relationships, species diversity, predator/prey relationships, population size, mortality rates, reproductive rates, meristic features, behavioral patterns and migratory patterns; and,
3. chemical parameters such as dissolved oxygen, carbon dioxide, acidity, dissolved solids, nutrients, organics, salinity, and pollutants (heavy metals, toxics and hazardous materials).

Although not comprehensive, examples of generic activities and impacts which could destroy or significantly impair the habitat are listed below to assist in applying the habitat impairment test to a proposed activity.

Any activity that would substantially degrade water quality, increase turbidity or sedimentation, reduce flows, or increase water temperatures in Croton River and Bay would result in significant impairment of the habitat. Any physical alteration of the habitat, through dredging, filling, or bulkheading, would result in a direct loss of valuable habitat area.

Habitat disturbances would be most detrimental during fish spawning and incubation periods, which generally extend from April through July for most warmwater species. Discharges of sewage or stormwater runoff containing sediments or chemical pollutants may result in significant adverse impacts on fish populations.

Similarly, spills of oil or other hazardous substances, and leachate of contaminated groundwater, constitute a potential threat to fish and wildlife in the bay. Of particular concern in this major tributary system are the potential effects of upstream disturbances, including water withdrawals, impoundments, stream bed disturbances, and effluent discharges. Establishment of minimum flow requirements for the Croton River up to the first impassable barrier to fish has had a significant beneficial effect on the area; however, under draught conditions, releases from the New Croton Reservoir can be reduced to zero.

Existing areas of natural vegetation bordering Croton River and Bay should be maintained to provide bank cover, soil stabilization, perching sites, and buffer areas. However, development of public access to the bay area may be desirable to ensure that adequate opportunities for compatible human uses of the fish and wildlife resources are available.

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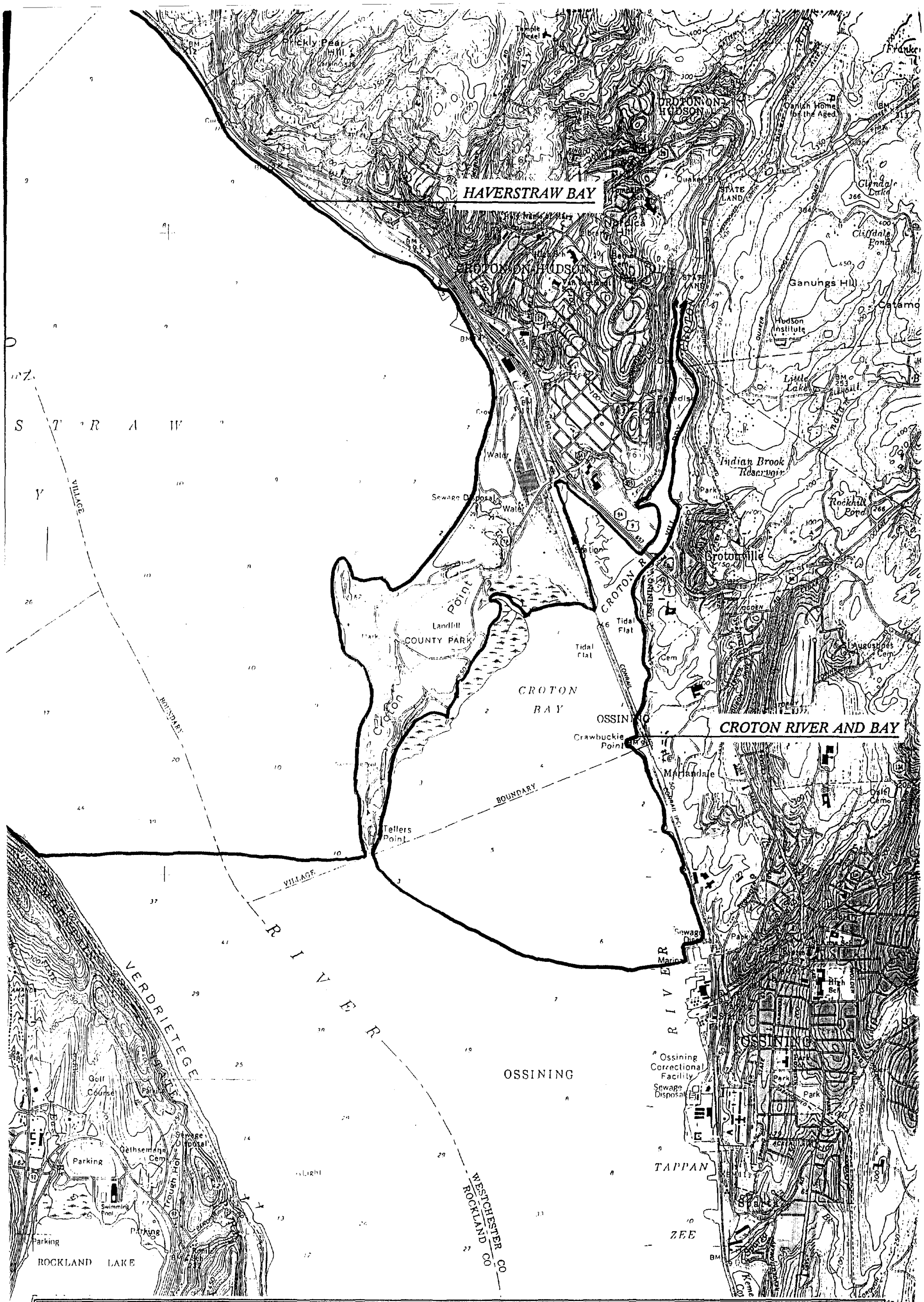

SIGNIFICANT COASTAL FISH AND WILDLIFE HABITATS

Croton River and Bay / Haverstraw Bay (in part)

Miles

0 ½ 1

N

New York State Department of State Division of Coastal Resources and Waterfront Revitalization

Prepared by T. Hart and G. Capobianco September 1990

COASTAL FISH & WILDLIFE HABITAT RATING FORM

Name of Area: **Haverstraw Bay**

Designated: **November 15, 1987**

County(ies): **Rockland; Westchester**

Town(s): **Clarkstown, Haverstraw, Stony Point; Cortlandt**

7½' Quadrangle(s): **Haverstraw, NY; NOAA Chart No. 12343**

Score	Criterion
40	Ecosystem Rarity (ER) The most extensive area of shallow estuarine habitat in the lower Hudson River (and in New York State), but rarity reduced by human disturbances; geometric mean: $(25 \times 64)^{1/2} = 40$.
36	Species Vulnerability (SV) Shortnose sturgeon (E) regularly occur in the area.
38	Human Use (HU) The area contributes to recreational and commercial fisheries throughout the northeastern U.S.; additive division: 25 + 25/2 = 38
25	Population Level (PL) A major spawning, nursery, and wintering area for various estuarine fish species; population levels unusual in the northeastern U.S.
1.2	Replaceability (R) Irreplaceable.

SIGNIFICANCE VALUE = [(ER + SV + HU + PL) X R]

= **166**

SIGNIFICANT COASTAL FISH AND WILDLIFE HABITATS PROGRAM
A PART OF THE NEW YORK COASTAL MANAGEMENT PROGRAM

BACKGROUND

New York State's Coastal Management Program (CMP) includes a total of 44 policies which are applicable to development and use proposals within or affecting the State's coastal area. Any activity that is subject to review under Federal or State laws, or under applicable local laws contained in an approved local waterfront revitalization program will be judged for its consistency with these policies.

Once a determination is made that the proposed action is subject to consistency review, a specific policy aimed at the protection of fish and wildlife resources of statewide significance applies. The specific policy statement is as follows: "Significant coastal fish and wildlife habitats will be protected, preserved, and, where practical, restored so as to maintain their viability as habitats." The New York State Department of Environmental Conservation (DEC) evaluates the significance of coastal fish and wildlife habitats, and following a recommendation from the DEC, the Department of State designates and maps specific areas. Although designated habitat areas are delineated on the coastal area map, the applicability of this policy does not depend on the specific location of the habitat, but on the determination that the proposed action is subject to consistency review.

Significant coastal fish and wildlife habitats are evaluated, designated and mapped under the authority of the Coastal Management Program's enabling legislation, the Waterfront Revitalization and Coastal Resources Act (Executive Law of New York, Article 42). These designations are subsequently incorporated in the Coastal Management Program under authority provided by the Federal Coastal Zone Management Act.

This narrative, along with its accompanying map, constitutes a record of the basis for this significant coastal fish and wildlife habitat's designation and provides specific information regarding the fish and wildlife resources that depend on this area. General information is also provided to assist in evaluating impacts of proposed activities on parameters which are essential to the habitat's values. This information is to be used in conjunction with the habitat impairment test found in the impact assessment section to determine whether the proposed activities are consistent with the significant coastal habitats policy.

DESIGNATED HABITAT: HAVERSTRAW BAY

HABITAT DESCRIPTION:

Haverstraw Bay extends approximately six miles on the Hudson River, from Stony Point to Croton Point, in the Towns of Stony Point, Haverstraw, and Clarkstown, in Rockland County, and the Town of Cortlandt, in Westchester County (7.5' Quadrangle: Haverstraw, N.Y.; NOAA Chart No. 12343).

The fish and wildlife habitat encompasses the entire river over this approximate six mile reach, which is the widest section of the Hudson estuary. Haverstraw Bay has extensive shallow areas (less than 15 feet deep at mean low water) which deepen to a navigation channel (which is dredged to maintain a depth of about 35 feet) in the western half of the area. During much of the year, this area is the place where freshwater from the upper river mixes with salt water from the Atlantic, producing a predominantly brackish water habitats, with salinities varying from 0-10 ppt. The land area surrounding Haverstraw Bay supports a variety of land uses, including industrial, commercial, residential, and recreational developments, although much undeveloped forestland also remains.

Habitat disturbances, such as dredging, shoreline filling and bulkheading, waste disposal, and pollution from upland and in-river sources, have all been significant at some time during the recent history of this area.

FISH AND WILDLIFE VALUES:

Despite various habitat disturbances, Haverstraw Bay possesses a combination of physical and biological characteristics that make it one of the most important fish and wildlife habitats in the Hudson River estuary. The regular occurrence of brackish water over extensive areas of shallow bottom creates highly favorable (if not essential) conditions for biological productivity within the estuary, including submergent vegetation, phytoplankton and zooplankton, aquatic invertebrates, and many fish species.

Although the location of the salt front varies annually (and seasonally), Haverstraw Bay regularly comprises a substantial part of the nursery area for striped bass, American shad, white perch, tomcod, and Atlantic sturgeon that are produced in the Hudson. Other anadromous species, such as blueback herring and alewife, spawn in upstream freshwater areas, but move south and concentrate in this area before leaving the river in the fall.

Haverstraw Bay is also a major nursery and feeding area for certain marine species, most notably bay anchovy, Atlantic menhaden, and blue claw crab. Depending on location of the salt front, a majority of the spawning and wintering populations of Atlantic sturgeon in the Hudson may reside in Haverstraw Bay. Shortnose sturgeon (E) usually winter in this area as well. Significant numbers of waterfowl may occur in Haverstraw Bay during spring (March-April) and fall (September-November) migrations, but the extent of this use is not well documented.

Haverstraw Bay is a critical habitat for most estuarine-dependent fisheries originating from the Hudson River. This area contributes directly to the production of in-river and ocean populations of food, game, and forage fish species. Consequently, commercial and recreational fisheries throughout the North Atlantic depend on, or benefit from, these biological inputs from the Hudson River estuary.

IMPACT ASSESSMENT:

A **habitat impairment test** must be met for any activity that is subject to consistency review under federal and State laws, or under applicable local laws contained in an approved local waterfront revitalization program. If the proposed action is subject to consistency review, then the habitat protection policy applies, whether the proposed action is to occur within or outside the designated area.

The specific **habitat impairment** test that must be met is as follows.

> In order to protect and preserve a significant habitat, land and water uses or development shall not be undertaken if such actions would:
>
> destroy the habitat; or,
>
> significantly impair the viability of a habitat.

Habitat destruction is defined as the loss of fish or wildlife use through direct physical alteration, disturbance, or pollution of a designated area or through the indirect effects of these actions on a designated area. Habitat destruction may be indicated by changes in vegetation, substrate, or hydrology, or increases in runoff, erosion, sedimentation, or pollutants.

Significant impairment is defined as reduction in vital resources (e.g., food, shelter, living space) or change in environmental conditions (e.g., temperature, substrate, salinity) beyond the tolerance range of an organism. Indicators of a significantly impaired habitat focus on ecological alterations and may include but are not limited to reduced carrying capacity, changes in community structure (food chain relationships, species diversity), reduced productivity and/or increased incidence of disease and mortality.

The tolerance range of an organism is not defined as the physiological range of conditions beyond which a species will not survive at all, but as the ecological range of conditions that supports the species population or has the potential to support a restored population, where practical. Either the loss of individuals through an increase in emigration or an increase in death rate indicates that the tolerance range of an organism has been exceeded. An abrupt increase in death rate may occur as an environmental factor falls beyond a tolerance limit (a range has both upper and lower limits). Many environmental factors, however, do not have a sharply defined tolerance limit, but produce increasing emigration or death rates with increasing departure from conditions that are optimal for the species.

The range of parameters which should be considered in appplying the habitat impairment test include but are not limited to the following:

1. physical parameters such as living space, circulation, flushing rates, tidal amplitude, turbidity, water temperature, depth (including loss of littoral zone), morphology, substrate type, vegetation, structure, erosion and sedimentation rates;
2. biological parameters such as community structure, food chain relationships, species diversity, predator/prey relationships, population size, mortality rates, reproductive rates, meristic features, behavioral patterns and migratory patterns; and,
3. chemical parameters such as dissolved oxygen, carbon dioxide, acidity, dissolved solids, nutrients, organics, salinity, and pollutants (heavy metals, toxics and hazardous materials).

Although not comprehensive, examples of generic activities and impacts which could destroy or significantly impair the habitat are listed below to assist in applying the habitat impairment test to a proposed activity.

Any activity that would substantially degrade water quality, increase turbidity or sedimentation, or alter water salinities or temperatures in Haverstraw Bay would result in significant impairment of the habitat. Any physical modification of the habitat or adjacent wetlands, through dredging, filling, or bulkheading, would result in a direct loss of valuable habitat area.

Habitat disturbances would be most detrimental during fish spawning and early developmental periods, which generally extend from April through August for most anadromous species using the area. Discharges of sewage or stormwater runoff containing sediments or chemical pollutants may result in significant adverse impacts on fish populations. Similarly, spills of oil or other hazardous substances, and leachate of contaminated groundwater, constitute a potential threat to fish and wildlife in the bay. Of particular concern in this major estuarine system are the potential effects of hydrologic disturbances, and effluent discharges. Existing areas of natural vegetation bordering Haverstraw Bay should be maintained to provide soil stabilization and buffer areas.

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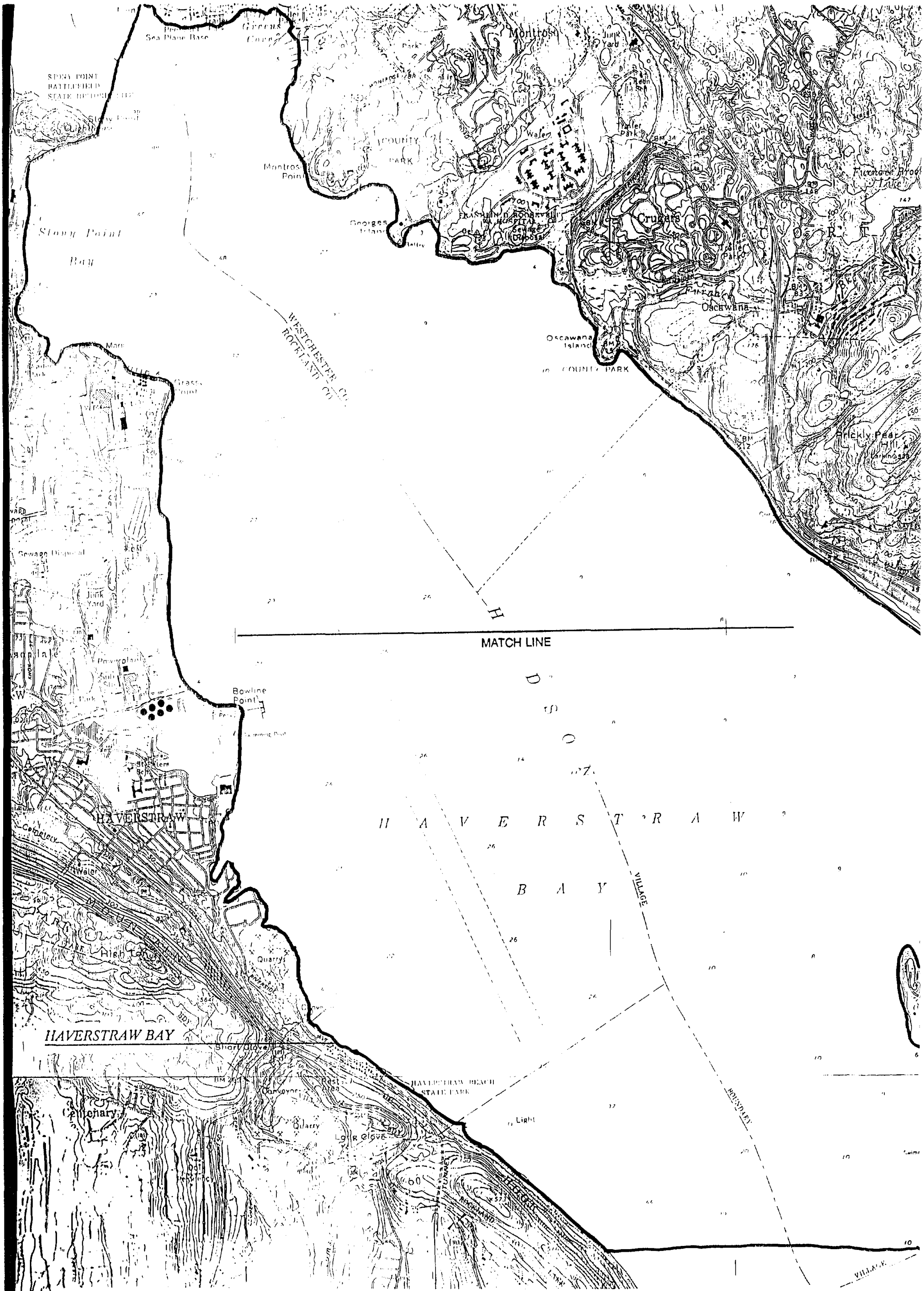


SIGNIFICANT COASTAL FISH AND WILDLIFE HABITATS

Haverstraw Bay (In part)

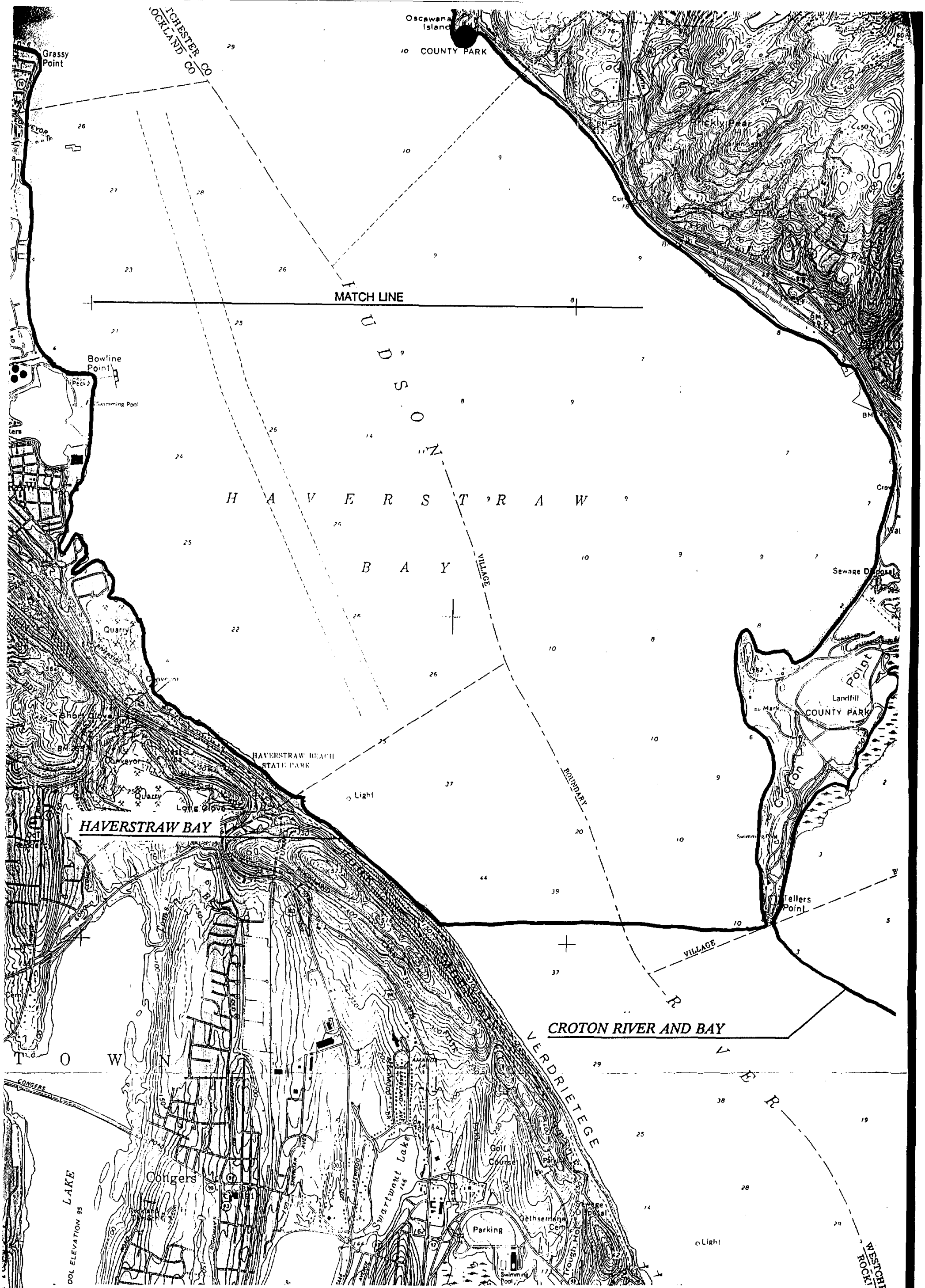
Miles

0 ½ 1

N

New York State Department of State Division of Coastal Resources and Waterfront Revitalization

Prepared by T. Hart and G. Capoblanco September 1990



SIGNIFICANT COASTAL FISH AND WILDLIFE HABITATS

Haverstraw Bay (In part) / Croton River and Bay (In part)

Miles

0 ½ 1

N

New York State Department of State Division of Coastal Resources and Waterfront Revitalization

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