FAIRWAY ESTATES

NORWICH, CONNECTICUT

JUNE 1989

EASTERN CONNECTICUT ENVIRONMENTAL REVIEW TEAM REPORT

EASTERN CONNECTICUT
RESOURCE CONSERVATION AND DEVELOPEMNT AREA, INC.

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NORWICH, CONNECTICUT

REVIEW DATE: MARCH 28, 1989

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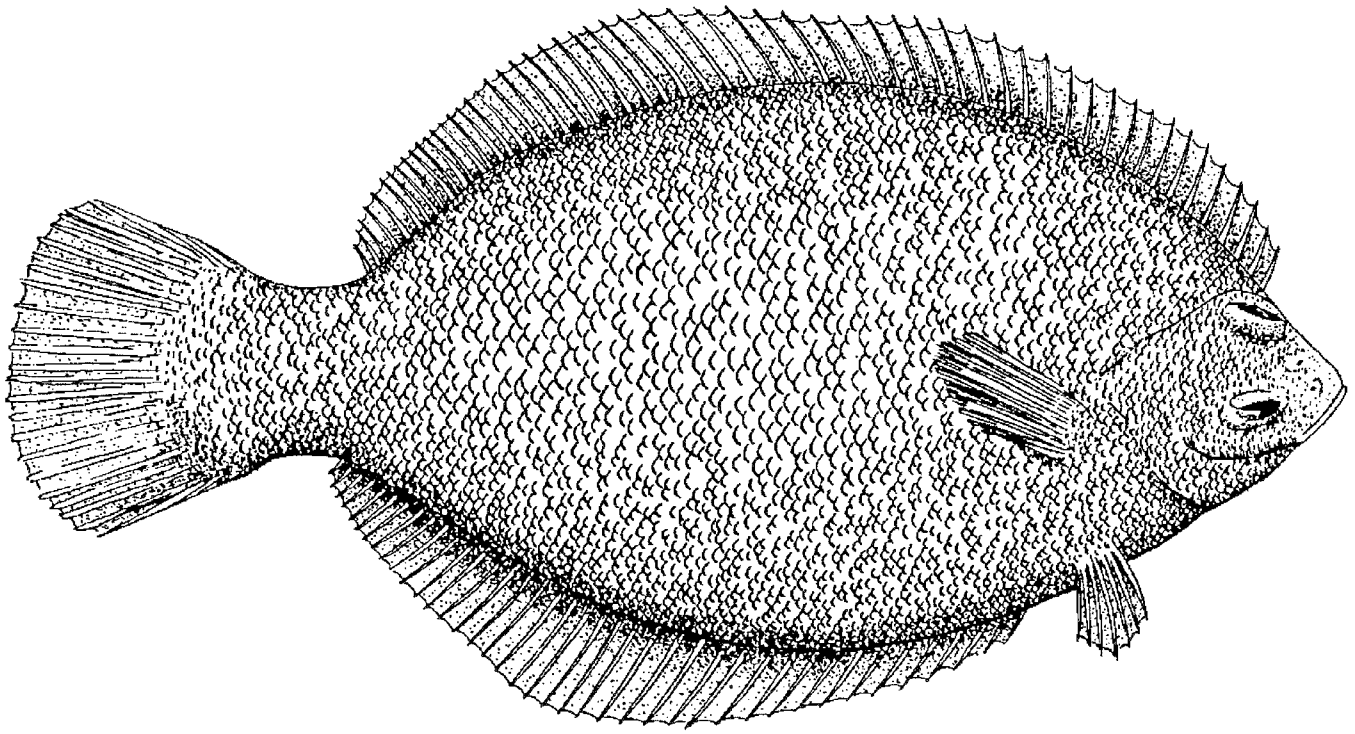

EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

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ENVIRONMENTAL REVIEW TEAM REPORT
ON

FAIRWAY ESTATES
NORWICH, CONNECTICUT

This report is an outgrowth of a request from the Norwich Planning Director for the Planning Commission to the New London County Soil and Water Conservation District (SWCD). The S&WCD referred this request to the Eastern Connecticut Resource Conservation and Development (RC&D) Area Executive Council for their consideration and approval. The request was approved and the measure reviewed by the Eastern Connecticut Environmental Review Team (ERT).

The ERT met and field checked the site on Tuesday, March 28, 1989. Team members participating on this review included:

Gerry Amt	Regional Planner	Southeastern CT Regional Planning Agency
Nels Barrett	Environmental Analyst	DEP-Coastal Resources
Nick Bellantoni	State Archaeologist	CT Museum of Natural History
Joan Brown	Environmental Analyst	DEP-Coastal Resources
Richard Carona	Transportation Planner	CONNDOT-Bureau of Planning
Kevin DesRoberts	Wildlife Assistant	DEP-Eastern District
Steve Hill	Wildlife Biologist	DEP-Eastern District
Pete Merrill	Forester	DEP-Patchaug State Forest
Brian Murphy	Fisheries Biologist	DEP-Eastern District
Nancy Murray	Biologist	DEP-Natural Diversity Data Base
Sidney Quarrier	State Geologist	DEP-Natural Resources Center
Liz Rogers	District Conservationist	USDA-Soil Conservation Service
Elaine Sych	ERT Coordinator	Eastern CT RC&D Area

Prior to the review day, each Team member received a summary of the proposed project, a list of the town's concerns, a location map, a topographic map, and and a soils map. During the field review the Team members were given preliminary plans and other information. The Team met with, and were accompanied by Planning Commission members, the Director of Planning, the Assistant Planning Director, Inland Wetland Commission members, the developers and concerned citizens. Following the review, reports from each Team member were submitted to the ERT Coordinator for compilation and editing into this final report.

This report represents the Team's findings. It is not meant to compete with private consultants by providing site designs or detailed solutions to development problems. The Team does not recommend what final action should be taken on a proposed project -- all final decisions rest with the Town and landowner. This report identifies the existing resource base and evaluates its significance to the proposed development, and also suggests considerations that should be of concern to the developer and the Town. The results of this Team action are oriented toward the development of better environmental quality and the long-term economics of land use.

The Eastern Connecticut RC&D Executive Council hopes you will find this report of value and assistance in making your decisions on this proposed multi-family development.

If you require additional information, please contact:

Elaine A. Sych
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1. INTRODUCTION

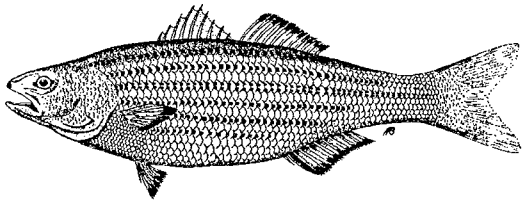
The proposed development is on 27 acres of steep ,rocky land that is the middle part of an undeveloped peninsula which juts into the Thames River estuary. The City of Norwich owns approximately ten (10) acres of "open space" land (Lucas Woods) at the south end or point of the peninsula. Trading Cove , a tidal cove off of the Thames River estuary, bounds the peninsula on the south and west, and the Thames River estuary itself forms the eastern boundary of the peninsula.

The peninsula is a prominent natural feature in the upper part of the Thames River estuary. The estuary which extends about fourteen (14) miles inland from New London to Norwich is an important natural and recreational resource. Much of the Thames River estuary is intensively developed. The southern half is urbanized as a major seaport. The northern end of the estuary (just north of the proposed development site) is also urbanized. A number of areas of intensive shore-front development occur in the middle part of the estuary, and railroad lines bound the estuary on either side. The proposed development site is one of the most prominent undeveloped land features on the estuary. It is a major scenic aspect of the landscape.

Trading Cove borders the west side of the proposed development site. This cove is one of two major coves on the northern part of the Thames River estuary. Poquetanuck Cove is on the other side of the estuary. These two large coves provide much of the remaining non-developed, natural shoreline of the whole Thames River estuary. On the main part of the estuary, most of the immediate shoreline and near-shore bank-lands have been altered by the railroad embankments and by development.

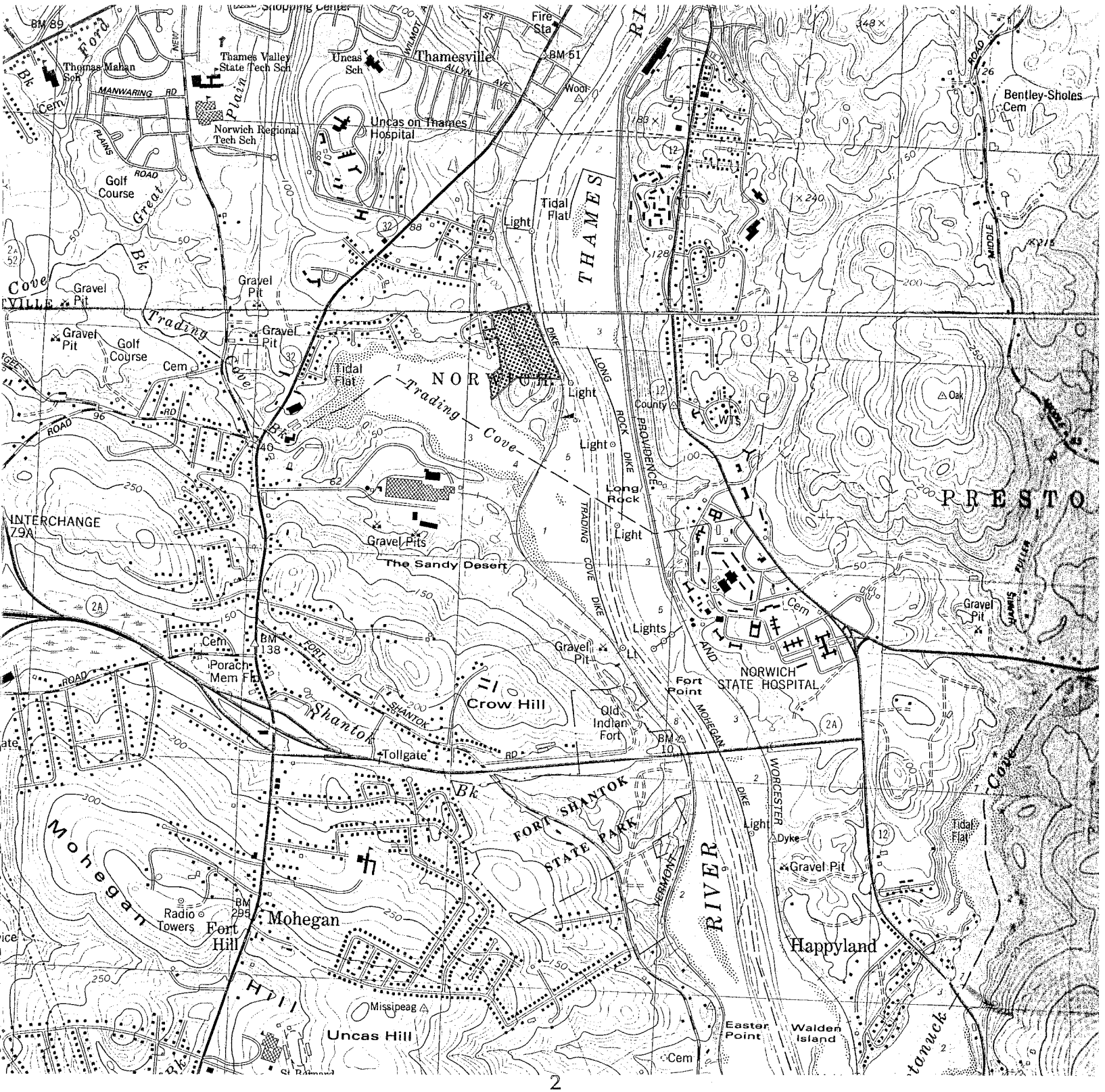
Trading Cove is a 1/2 mile long, shallow, tidal mudflat cove bounded by natural and some residentially developed shoreline. The proposed development area comprises a significant and topographically prominent part of the shoreline of Trading Cove. It forms a steep, rocky, forested headland that bounds the eastern side of the cove. This headland or peninsula is the most prominent and scenic feature of the cove.

The proposed development, by placing 168 living units in multi-storied buildings on the high ground of the peninsula, will substantially alter the scenic and natural character of the cove.



LOCATION MAP

Scale 1" = 2000' Approximate Site



2. PHYSIOGRAPHY OF THE SITE

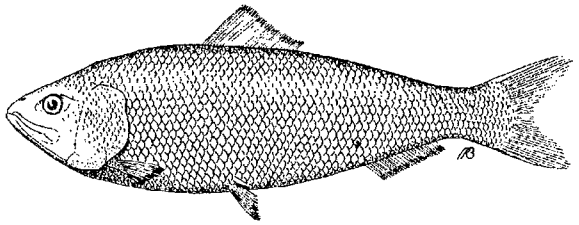
The peninsula of the development site is a bedrock-cored hill that projects southward into the estuary. It is about 1500 feet in length, about 800 feet in width, and is about 150' high at its highest elevation. It stands as a prominent topographic feature in both Trading Cove and in the Thames River estuary .

Bedrock is at or near the surface over most of the peninsula. On the west side, large bedrock cliffs face and tower above Lucas Park Road. The southwest area of the peninsula that borders Trading Cove consists of very steep (30% + slopes) bedrock slopes that run to the water's edge. The east side of the peninsula is also steep, but bedrock is slightly less visible at the surface. However, bedrock appears to be near the ground surface in this area also. The east side forms a prominent exposed slope facing the Thames River estuary. The Central Vermont railroad tracks run at the base of this slope on a filled embankment forming the shoreline of the estuary. Small wetlands and areas of restricted drainage occur between the railroad embankment and the adjacent peninsula slope.

The top of the peninsula is less steep with 8 to 15 percent slopes and local areas of greater steepness. The top area has a width of several hundred feet and runs much of the length of the peninsula. As on the east slope, bedrock exposures on the top are not everywhere apparent, but bedrock is close to the surface. The more-level top area of the peninsula runs to the north and joins the 'mainland' at an elevation similar to that of Lucas Park Road (before the road dives downhill to reach Trading Cove). The north end of this 'top area' provides the logical access to the site.

Approximately 10 acres of Town of Norwich's open space land makes up the southern part or point of the peninsula.

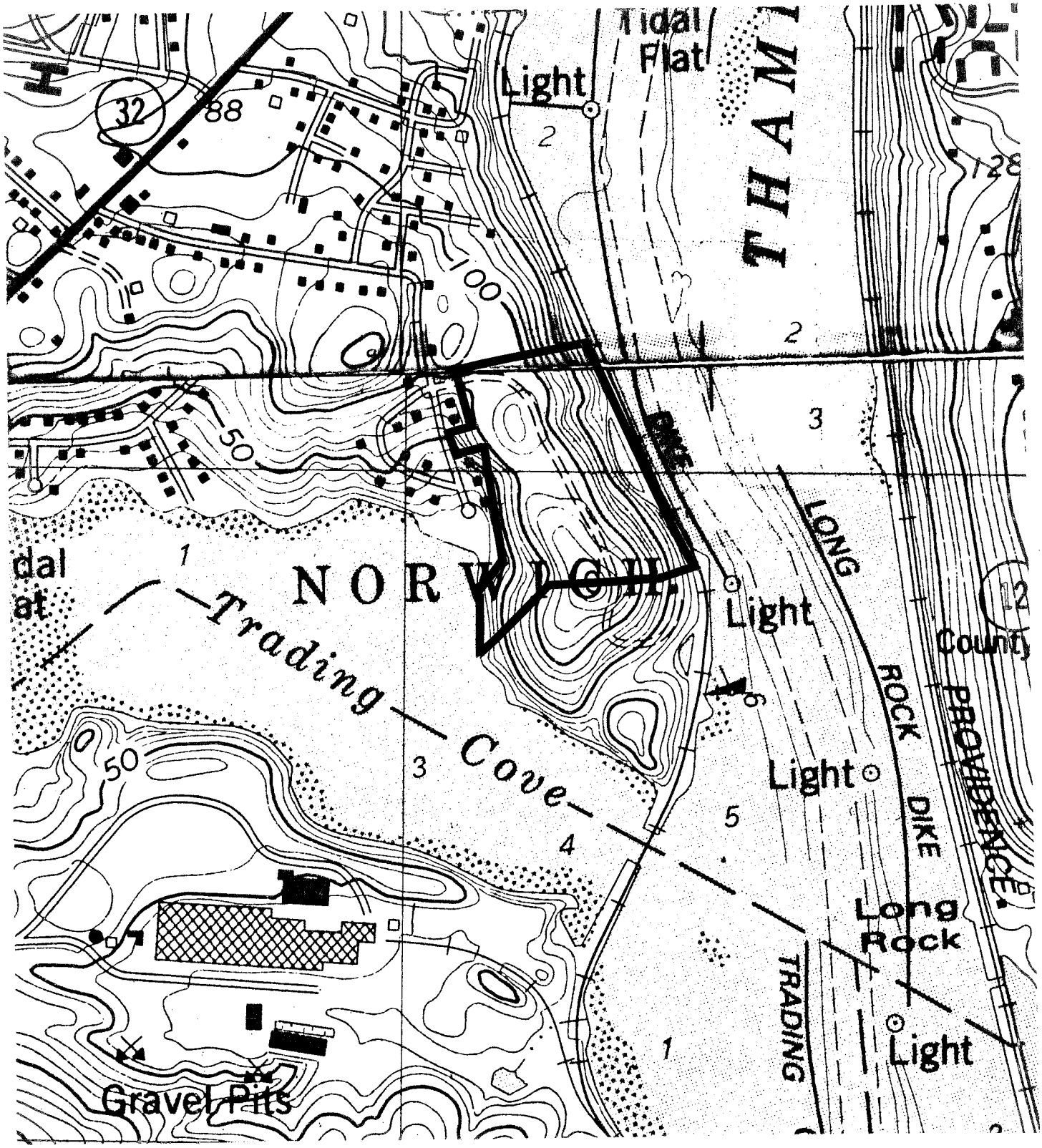
The shape of the peninsula is such that development on its top and west side will tower over Trading Cove and over the residential development at the south end of Lucas Park Road. Development on top and on the east side will be scenically prominent on the Thames estuary. Development on the southern part of the proposed site will tower over the town owned property at the south end of the peninsula.



TOPOGRAPHIC MAP

Scale 1" = 1000'

Approximate Site Boundary



3. GEOLOGY

The bedrock geology of the site is shown on USGS Map GQ-576, Bedrock Geology of the Uncasville Quadrangle by Richard Goldsmith, 1967. The bedrock is exposed in many areas on the site. The bedrock consists of biotite gneiss and schist of the Tatnic Hill Formation. The rock is layered, and these layers strike in a WNW/ESE direction and dip (or tilt) to the north at 30 to 40 degrees. The strike and dip of these layers may be significant because the same layers run under the houses to the northwest on Lucas Park Road. In some cases seismic vibrations from blasting are carried with less dampening when the path is along the same rock layer.

The Honey Hill-Lake Char Fault , a large, ancient fault zone of great interest to geologic scientists, runs in an east-west line just to the south of the site. Some of the features of the fault are well exposed in the rock exposures on the City of Norwich land at the south end of the site, and geologists from various universities in the northeast come to this location to study these features.

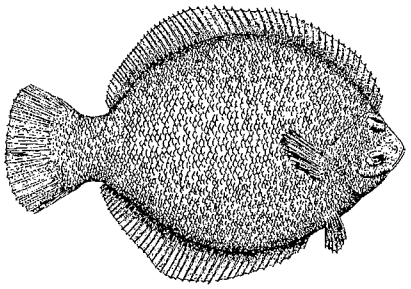
It is important to note that this is not an active fault, and it does not have rock fracture features which are normally associated with young faults. This fault was active several hundreds of millions of years ago when these rocks were buried more than seven miles below the earth's surface. The faulting movement squeezed the rocks like toothpaste rather than fracturing them. It is the evidence of high temperature "ductile" shearing and squeezing that interests the geologists.

The Honey Hill-Lake Char Fault is a major geologic feature of eastern Connecticut running eastward from Chester,CT to Griswold where it turns to the north and runs northward into Massachusetts. The Honey Hill section of the fault is named after the Honey Hill area of Hadlyme where the fault is well exposed. The fault's northward, Lake Char section is named after Lake Chargoggagoggmanchauggagoggchaubunagungamaugg where it is well exposed just to the north of the Connecticut border in Massachusetts.The fault is well exposed at a number of locations in eastern Connecticut, and the exposures at the south end of this peninsula are not unique.

Rocks to the south of the fault (the south side of Trading Cove and adjacent areas of southeastern CT) are believed to have been part of the African Plate of the earth's surface which collided with the North American Plate more than 300 million years ago forming the Appalachian Mountains. Rocks on the north side of the fault are believed to have been associated with the ocean bottom that separated the North American and African plates.

Rocks of the fault zone have been hardened and strongly layered making them resistant to erosion. Thus the bedrock in this vicinity is strong , hard rock, forming the core of the hills and is close to the surface.

The surficial geologic materials on the site are shown on USGS Map GQ138 Surficial Geology of the Uncasville Quadrangle, by Richard Goldsmith, 1960. The surficial materials consist of a very thin and discontinuous layer of "glacial" till which was deposited by the advance of the last glacier. This glacier receded from the area bout 18,000 years ago. The "glacial" till is a mixture of clay,silt, sand and boulders . This till provides a thin cover (mostly less than 10 feet thick) for the bedrock core of the peninsula.



4. SOILS REVIEW

The site has severe limitations for development based on the steepness of slope and the abundance of ledge and rock outcrops. A detailed and complete erosion and sediment control plan should be prepared for the project to prevent any adverse environmental impacts to the Thames River and Trading Cove. If permits are granted for construction it will be be vital that this plan be properly implemented and maintained.

The following information should be included with the Erosion and Sediment Control Plan.

A. A narrative describing:

1. The project development

2. The schedule for grading and construction activities. This is extremely important because of the limitations of the site.

3. The design criteria for proposed soil erosion and sediment control measures and stormwater management facilities.

4. The construction details for proposed soil erosion and sediment control measures, and storm water management systems.

5. The installation and/or application procedures for proposed soil erosion and sediment control measures and storm water management facilities.

6. The operations and maintenance program for proposed soil erosion and sediment control measures and storm water management facilities.

B. A site plan map showing:

1. The location of the proposed development.

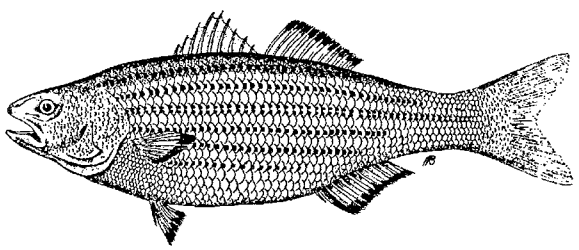
2. The existing and proposed topography including soil types.

3. The proposed area alterations including cleared, excavated, filled or graded areas.

This is important since many of the buildings and road areas are located where either large cuts or fills will be necessary.

4. The location of all proposed soil erosion and sediment control measures.

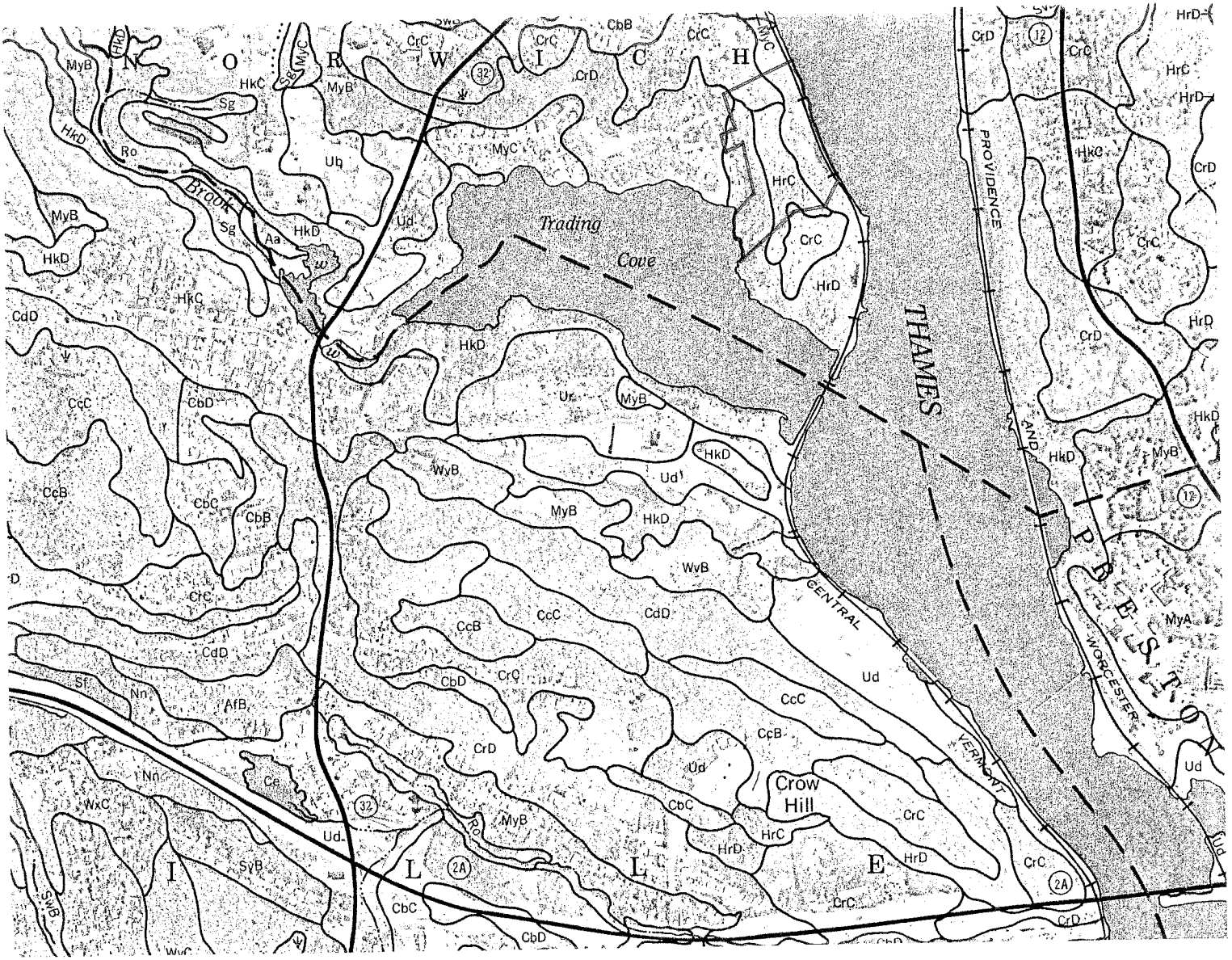
When this information is submitted the Soil Conservation Service working through the New London County Soil and Water Conservation District will be available to review the plan at the towns request.



SOILS

Scale 1" = 1320'

New London County
USDA-Soil Conservation Service
562 New London Turnpike
Norwich, CT 06360
887-4163



Soils Descriptions

Hrc - Hollis-Charlton-Rock outcrop complex, 3 to 15 percent slope

Crc - Charlton-Hollis fine sandy loams, very rocky, 3 to 15 percent slope

HrD - Hollis-Charlton-Rock outcrop complex, 15 to 45 percent slope

5. GEOLOGIC CONCERNS FOR DEVELOPMENT

1. Roads

Proposed roads are laid out so that main access is along the top of the peninsula from the north and an additional access road up from the cul-de-sac at the south end of Lucas Park Road. The proposed road on the west side of the top of the site will probably require considerable excavation and possibly blasting. Elevations along this line rise and fall from elevation 100' to nearly elevation 140', and side hill slopes are locally steep. This road's return on the peninsula's east side will have to be cut into an existing 4 to 1 slope (25%) or steeper along most of its length. To get the proposed road width , on this type of a slope a 10' deep cut would have to be dug and blasted. Filling the road embankment on the downslope side would cause potential disturbance to all downslope areas. It is unclear if the slope could be stabilized on the 25% and greater natural slopes. Extensive disturbance could occur to all downslope areas.

The access road from the cul-de-sac on Lucas Park Road is shown to rise 50 feet in a run of 250 feet, making it a 20% grade. Even this would appear to require a fill height of 20 feet in the lowland near the cove. The upper portion of this road crosses areas of very large boulders and bedrock which may have to be blasted for road construction. Protection of the adjacent cove area during construction could be difficult.

The proposed road network appears to be both impractical and potentially very destructive to the natural features of the site. It appears to be impractical because of the great elevation changes that cannot be made while meeting nominal road grade specifications and because of extensive rock cuts that would have to be made. It would be potentially destructive to the natural features of the site both because of the extensive excavation, blasting and filling required during construction and because of the likely inability to stabilize and protect downhill slopes in the long term.

2. Building sites

For the most part, proposed buildings have been laid out without respect to land elevation changes. Many of the buildings are laid out on ground that has 20 to 30 feet of elevation change within the building footprint. One building is laid across a near vertical 15 foot drop as part of a 40 foot elevation change for the building as a whole. Another building has more than 55 feet of elevation change on the land under the building. The developer has given no information how he plans to deal with these elevation changes. Here again, it appears that the proposed design is both impractical and would be very destructive to the natural features of the site. Many of the buildings

are shown on very steep slopes and it is recommended that a geotechnical engineer be used to insure suitability of construction practices.

On site water supply and on site sewage disposal are not an issue, as public water supply and public sewers are proposed for the site. Because of the closeness of bedrock to the surface, installation of these lines would presumably require a trench blasted in rock for much of the area.

3. Drainage

Proposed surface water drainage would drain the west side of the road system to a storm discharge into Trading Cove near the present storm discharge at the cul-de-sac of Lucas Park Road. The east side of the site would be drained into a small wetland at the foot of the slope, on the inside of the railroad embankment. This would drain through a culvert in the railroad embankment to the Thames River Estuary. Both Trading Cove and the small wetland on the east side of the site would be particularly sensitive to sediment buildup both during construction and during the use of the project. No provision was proposed for a sediment trapping pond before discharge. Water will be passing through the storm drain system at high velocity because of the steep drops in the pipes. A carefully designed sediment trapping system would have to be built to protect the adjacent water bodies (Trading Cove, wetland , and Thames estuary). It remains to be demonstrated if such a sediment trapping system could be successfully designed, installed and maintained. Failure to achieve this could subject the adjacent bodies of water to excessive and damaging sedimentation during both the projects construction and use phases.

4. Conclusions and Recommendations

a. It appears that the proposed layout of roads and buildings has not been carefully thought out in relation to the extreme topography and rock ledge ground conditions on the site. This presents a number of potential problems including: excessively steep roads, large amounts of excavation and blasting, the placement of buildings across large elevation changes, and the permanent disturbance of large areas of steeply sloping natural land.

b. Buildings are proposed on excessively steep and rugged land suggesting the need for review by a geotechnical engineer to insure safety.

c. It appears that a significant amount of blasting will be required. It is recommended that a pre-blast survey be made of the Lucas Park Road area.

d. The proposed storm drainage system could discharge a considerable amount of sediment

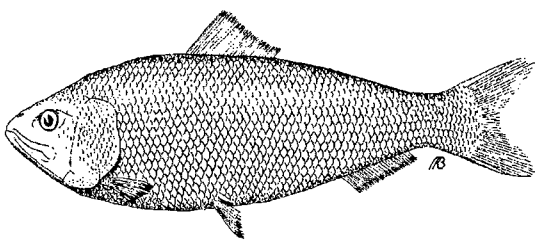
into Trading Cove and into the wetland on the east side of the site. A new storm drainage system with sediment retention ponds should be designed.

e. Sediment and erosion control during the construction phase would seem to be almost impossible on the steep slopes. It is recommended that no excavation or filling be planned on slopes of 20% of greater. Erosion control on slopes in the 10% to 20% range may be very difficult to achieve.

f. The construction of twenty-one, two and a half story buildings on the sides and top of this peninsula will totally alter the scenic aspects of Trading Cove and of the Thames River estuary. This seems inconsistent with the stated intent of the zoning PUD provisions to: "enhance the appearance of neighborhoods through the preservation of natural features..." The proposed development would seem to completely compromise most of the important natural features of this site.

g. The natural values of the site, and its scenic importance to the cove and to the estuary, would seem to argue for a no increase above the minimum density of the R 25,000 sq. ft. zone. It is recommended that consideration be given to clustering the minimum number of units (±25) on the northern end of the site in one or two buildings and preserving the rest of the site for open space.

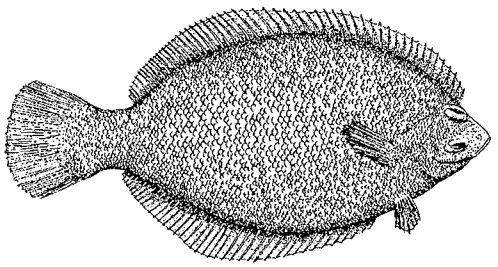
h. The site has considerable scenic and passive recreational potential. The site is of natural resource significance to the region as whole and is an important, remaining piece of undeveloped shoreline for the cove and the estuary. It is recommended that consideration be given to public acquisition to preserve the site as open space.



6. NATURAL DIVERSITY DATA BASE

The Natural Diversity Data Base maps and files have been reviewed regarding the area of the proposed development. According to the information, there are no known extant populations of Federally Endangered and Threatened species or Connecticut "Species of Special Concern" occurring at the site in question.

Natural Diversity Data Base information includes all information regarding critical biologic resources available to us at the time of the request. This information is a compilation of data collected over the years by the Natural Resources Center's Geological and Natural History Survey and cooperating units of DEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultation with the data base should not be substituted for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as enhance existing data. Such new information is incorporated into the Data Base as it becomes available.

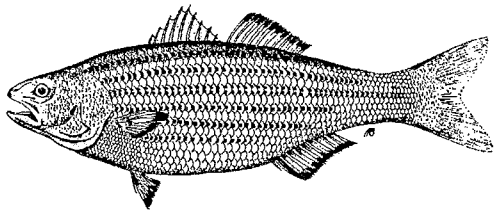


7. VEGETATION

This rocky outcrop has a typical oak ridge type of forest cover. The overstory is mainly black and white oak with some black birch and red maple. The birch and maples are found mainly in selected spots where the soil is a little deeper. There were a few very scattered white pine and one dormant pitch pine was noted. There was also some hemlock noted along the shore of the cove.

The understory was mostly black birch and black cherry with a few stems of gray birch, flowering dogwood, sassafras, some red cedar and pitch pine on one of the rock outcroppings. Except for the very top of the ridge there was a pretty consistent understory of Mountain Laurel. In areas not covered by laurel, huckleberries, blueberries and sedges were prevalent. Two or three juniper bushes were also noted in the more open areas.

The condition of the oak stand was poor, but normal for these severe conditions (strong winds and poor, shallow soil). The density of the building and roads as proposed would take up or remove much of the tree cover along the upper and top part of the ridge. Because the soils are so shallow to bedrock direct sunlight would probably heat and dry the soils so severely that some of the laurel would die back. The laurel acts as a noise and soil erosion barrier that must be maintained on this very adverse site. Absolute minimum tree removal should be done during the construction phase. Gradual thinning can be done later as the plants become accustomed to the increases in heat and light.



8. WILDLIFE HABITAT

Wildlife Habitat Considerations

Mixed hardwoods is the major wildlife habitat type throughout the project site. The overstory is dominated by white oak, red oak, black birch, red maple, and scattered white pine. The understory consists of dense mountain laurel growth throughout most of the site. Ground vegetation growth is sparse in many areas due to the thick understory cover.

Selective cordwood cutting has taken place in several areas on the site, allowing a diversity of understory vegetation to regenerate. Dominant species include highbush blueberry, lowbush blueberry, red maple saplings, black cherry saplings, birch saplings, red cedar, mountain laurel, oak saplings, viburnum spp, sweet fern, northern bayberry, sassafras, greenbriar, and black berry. Ground vegetation consists of various grasses, ferns, and scattered spotted winterberry growth.

A small wetland is located along the eastern boundary of the property adjacent to the railroad tracks. This wetland resembles a drainage ditch and probably was created when the railroad was built. When water in the wetland reaches a certain depth it is outletted into the Thames River. The gravel bottom limits aquatic vegetation growth. The steep rocky terrain along the western bank of the wetland consists of mountain laurel and highbush blueberry. The eastern bank is dominated by red maple, sensitive fern, and a few species of rushes, sedges, and grasses. The east side is mowed periodically by the railroad company; thus controlling the vegetation growth. Due to the small size of this wetland and location near the railroad, it currently provides little wildlife habitat.

Wildlife Species

Bird species observed inhabiting or utilizing the site included flocks of black-capped chickadees and golden crowned kinglets, bluejays, cardinals, northern flickers, and a variety of other songbirds were heard.

Mammalian species utilizing the site include white-tailed deer, eastern cottontail, grey squirrels, raccoons, and various other small mammals.

Impacts of Development on Wildlife

As the preliminary plans indicate, the 168-unit development will require removal of a high percentage of the present vegetation throughout the site. This will result in fragmentation of the mixed hardwood habitat type and the isolation of remaining habitat in the southern end of the peninsula, which will in turn reduce wildlife species diversity and richness. Species that are intolerant to human disturbances will be forced to emigrate into adjacent habitat. Species dispersion into adjacent habitats may result in competition with species already occupying the area. Many species will also be forced to inhabit less desirable habitat; decreasing survivability. Species more tolerant of man such as starlings, robins, house sparrows, and raccoons may increase in number and become a nuisance.

The discharge of stormwater is proposed to be located in three locations. Stormwater will be discharged from two locations into the wetland near the eastern boundary of the site and from one location into Trading Cove. The size and depth of the wetland limits its use as a detention basin. Since it is outletted into the Thames River, the influx of sediments and pollutants from stormwater will flow into the Thames River. The discharge of stormwater into Trading Cove will result in increased pollution and sedimentation to this estuarine ecosystem. The use of catch basins (when maintained properly) will trap heavy sediments, but will allow pollutants and fine silt to enter the areas of discharge.

Another major concern is the steepness of slope throughout most of the site. Disturbances to soil will result in erosion and sedimentation, creating the high risk of impacting Trading Cove and the Thames River.

Mitigation of Impacts of Development on Wildlife

There are several measures that can be taken to minimize the effects of development on wildlife. There should be at least a **one hundred foot buffer** along areas of the site that are adjacent to Trading Cove and the Thames River, in which no vegetation removal should take place. Construction should be discouraged on the steep slopes.

Vegetation removal should be kept to a minimum. This will reduce habitat destruction and be more aesthetically pleasing for the residents of the development.

It would be beneficial to wildlife and the surrounding communities ecologically and aesthetically if the town of Norwich were to purchase this remaining parcel of the peninsula and preserve it in its natural state.

9. FISHERIES HABITAT

Site Description

The proposed Fairway Estates condominium development will impact the Thames River, Trading Cove and its associated aquatic resources. This section of the report will address these impacts and outline necessary mitigation measures needed to reduce and offset losses to the aquatic ecosystem.

The proposed development site which is located on an "environmentally sensitive" peninsula. The project involves the construction of 168 condominium units that will be serviced by city water supply and sewage disposal. Trading Cove forms the southwestern boundary of the project while the Thames River lies on the eastern boundary. Trading Cove Brook enters the cove under Route 32. Extremely steep slopes characterize the development site. All forms of surface runoff will either drain into the Thames River or Trading Cove.

The Thames River estuary originates in Norwich with the confluence of the Yantic and Shetucket Rivers. The river which is tidal along its entire length drains southward emptying into the Long Island Sound at the western section of Fishers Island Sound. The river is heavily utilized by recreational boaters and fishermen. Oxygen depletions have occurred in the upper stretches of the Thames River in the summer due to high organic content in bottom sediments, high water temperatures, long flushing times, and poor mixing between surface and bottom waters (Welsh and Stewart 1984).

Surface waters of the Thames River and Trading Cove are classified by the Department of Environmental Protection (DEP) as "Class SC/SB". Designated uses for this classification are: suitable habitat for finfish, shellfish, and wildlife; recreational boating; industrial and other legitimate uses, including swimming and navigation.

Aquatic Resources

The Thames River supports a rich diversity of resident marine and estuarine finfish, anadromous fish, and shellfish. At least fifty species of finfish have been documented in the river (Welsh and Stewart 1984). Permanent fish residents of importance in the project area include; Atlantic tomcod, white perch, and winter flounder. Species of forage fish which inhabit the area are: killifish, mummichogs, and silversides.

Anadromous fish (fish which spawn in freshwater and live in marine waters) that are present in the study area are: blueback herring, alewives, American shad, hickory shad, and rainbow smelt. Alewives and smelt are known to spawn in Trading Cove Brook below the Route 32 dam. A small commercial fishery for American eel exists in the river. Atlantic salmon restoration efforts are underway within the Thames River watershed and a fishway is planned for the Greenville Dam in Norwich to assist with upstream fish passage.

Migratory fish that utilize estuarine waters of the Thames River as feeding and nursery areas on a seasonal basis are striped bass, bluefish, menhaden, blackfish, and bay anchovy.

Whitworth et al. 1975, reported that the Thames River from Stoddard Hill to Norwich supports a recreational fishery for: striped bass, bluefish, Atlantic mackerel, Atlantic tomcod, winter flounder, white catfish, American eel, alewife, rainbow smelt, and white perch.

The Thames River also supports a variety of shellfish such as: hard clams, soft clams, blue crabs, lobsters, and whelks (Welsh and Stewart 1984). These species are harvested for commercial and recreational purposes.

Freshwater fish which inhabit Trading Cove Brook are native brook trout, white sucker, fallfish, blacknose dace, and tessellated darter. In addition, the Bureau of Fisheries (DEP) annually stocks Trading Cove Brook with yearling brook trout.

Impacts

The following impacts of the Fairway Estates Condominium development on the Thames River and Trading Cove can be expected if proper mitigation measures are not implemented:

1. **Construction site soil erosion and sedimentation of the Thames River and Trading Cove through increased runoff from unvegetated areas:** During construction topsoil within the proposed building lots will be exposed and susceptible to runoff events especially since site slopes are "extremely" steep. Topography in some areas contains slopes greater than 60%. Devegetation and steep slopes on this parcel present a situation which is very conducive to the development of serious erosion problems. Erosion and sedimentation due to construction has long been regarded as a major cause of aquatic habitat degradation. Nationally, silt is considered a major non-point source of stream pollution. Excessive sediment deposition could impact the local estuarine ecosystem in the following ways:

(1) Sediment reduces the survival of resident fish eggs and hinders the emergence of newly hatched fry. Adequate water flow, free of excess sediment particles is required for fish egg respiration and successful hatching.

(2) Sediment reduces the survival of aquatic insects. Since aquatic insects are important food items in fish diets, reduced insect populations levels in turn will adversely affect fish growth and survival. Fish require an excessive output of energy to locate preferred prey when aquatic insect levels decrease.

(3) Sediment reduces the amount of usable habitat in shallow water areas. Resident fish may be forced to disperse to other areas not impacted by siltation. Shallow waters provide important feeding, spawning, and refuge habitat for both adult and juvenile fishes. For example, commercially important species of fish such as winter flounder migrate inshore during late winter, early spring to spawn. Once hatched, juvenile flounder utilize valuable shallow inshore habitat as a nursery area.

(4) Turbid waters impair gill functions of fish and normal feeding activities of fish. High concentrations of sediment can cause mortality in adult/juvenile fish by clogging gills.

(5) Sediment contributes to the depletion of dissolved oxygen. Organic matter associated with soil particles is readily decomposed by microorganisms thereby effectively reducing oxygen levels.

2. **Aquatic habitat degradation in the Thames River due to the influx of stormwater drainage from nearby residential housing :** The developer intends to discharge all stormwaters either directly into the Thames River or Trading Cove. Stormwaters can contain a variety of pollutants that are detrimental to aquatic organisms. Pollutants commonly found in stormwaters are: hydrocarbons (gasoline and oil), herbicides, heavy metals, road salt, fine silts, and coarse sediment. The introduction of sediments to local waters could result in the loss of shallow water habitat. Furthermore, spilled petroleum based chemicals or other toxicants can precipitate partial or complete fishkills and result in water quality degradation.

3. **Transport of lawn fertilizers and chemicals to the River :** Runoff and leaching of nutrients from fertilizers and various lawn chemicals placed on condominium lawns may stimulate "algae blooms" and further degrade water quality. In the past, the Thames River has experienced low dissolved oxygen during the summer. The precipitation of algae blooms may further decrease already low dissolved oxygen levels resulting in partial or complete fish kills.

Recommendations

The following recommendations should be considered by the City of Norwich to mitigate impacts to the estuarine environment of the Thames River and Trading Cove.

1. **Discourage residential development on the steep side slopes of this peninsula:** Development of condominiums on steep side slopes poses the greatest threat to the aquatic resources of the river. The overall size of the project should reduced. Condominiums should be clustered on the top of the hill, effectively reducing the total area to be impacted by residential development. This approach will minimize local watershed alteration and act as a "buffer" or barrier against pollution. Impacts such as soil erosion, can be more effectively minimized if these areas are left in their natural condition. Research has proven that properly sized buffer zones help prevent damage to aquatic ecosystems that support diverse fish and aquatic insect life (USFWS 1984;USFWS 1986;0DFW 1985) since they assist in the absorption of surface runoff and other pollutants before they can enter fragile aquatic environments.

2. **Install and maintain proper erosion and sedimentation controls during site construction activities:** Complete mitigation of silt runoff may be difficult to achieve at this construction location especially if development is allowed on steep slopes. Disturbed soils can be more readily contained if construction is only allowed on the top of this peninsula. All silt fences or hay bales should be placed downslope of disturbed areas. Proper installation of silt fences/ haybales requires that they be placed within excavated trenches to ensure that all runoff is properly contained. Only small areas of soil should be exposed at one time and these areas should be reseeded and restabilized as soon as possible (refer to **Soils Review** for specific recommendations). A city official should be responsible for inspecting this development on a daily basis to ensure that contractors have complied with all stipulated mitigation devices. Past siltation disturbances in Connecticut associated with residential housing developments have occurred when individual contractors either improperly deployed mitigation devices or failed to maintain these devices on a regular basis. Proper installation and maintenance of these devices is critical to environmental well being.

3. **The developer should submit a detailed stormwater management plan for city review:** Current stormwater management plans involve outletting stormwaters directly into Trading Cove and the Thames River. The impact of stormwaters could be reduced at this site if the size of this condominium project is reduced in size. Additionally, if feasible, the developer should consider the construction of a detention basin(s) to collect stormwater discharge before release into aquatic habitats. Detention basins will act as a final settling

location of solid coarse materials preventing sedimentation of shallow water habitat in the river.

Effective management of stormwaters and roadway runoff can only be accomplished through proper design, location, and maintenance of catch and detention basins. Maintenance is very critical. Roadway catch basins and any detention basins should be regularly maintained to minimize adverse impacts. The use of road salt to deice roads should be prohibited. Catch/detention basins will only trap heavy, coarse sediments reducing the likelihood of excessive sedimentation of shallow water habitat; however, waters that contain pollutants such as salts, hydrocarbons, and heavy metals will degrade water quality of the immediate area. This impact cannot be effectively mitigated.

4. **Limit liming, fertilization, and the introduction of chemicals to condominium lawns :** This will help abate the amount of additional nutrients and chemicals to the Thames River. Nonphosphorus lawn fertilizers are currently available from various lawn care distribution centers.

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10. PLANNING REVIEW

The planning concerns related to the proposed construction of 168 multi-family dwellings on the 27-acre subject site are numerous. They are all related to the location and physical characteristics of the site.

In evaluating the site for this use, it is important to examine the Zoning Ordinance to determine the appropriateness of the proposal.

The residential zones in this part of the City are either R10, R-17.5, or R-25. The uses permitted by right in these zones are single-family detached residences and related accessory uses. In addition, certain public and institutional uses are permitted by Special Exception. The minimum lot area required for each residence is 10,000 square feet in the R-lO Zones, 17,500 square feet in the R-17.5 Zones, and 25,000 square feet in the R-25 Zone.

As the Zoning Map shows, proposed access to the site using Lucas Park Road is through R-lO and R-17.5 Zones, both of which are heavily developed with single-family residences. The R-25 Zone, which includes the site of the proposed development, is undeveloped except for two single-family residences fronting on Lucas Park Road just south of the sharp right turn. There is, in effect, a well established neighborhood of single-family residences in this part of the City.

The proposed use is inconsistent with the character of this neighborhood and with the zoning plan for the City. The high density development would concentrate an additional large population in an area of the City already well developed at lower densities and by a significantly different type of housing. The higher density development would be accessed through the lower density neighborhood, creating increased traffic noise and safety hazards. In addition, the site is remote from the public and commercial services provided by the community and upon which higher-density zones are traditionally focused.

It is difficult to see how the proposed development conforms to the stated intent of the PUD provisions of the Zoning Ordinance.

The following comments relate to the proposed performance criteria listed in Section 13.1 of the Ordinance:

(a) The steep slopes, shallow-to-bedrock soils, rock outcrops, and high visibility of the site from the east and west seem to have been largely ignored in the locations of driveways and

buildings. Buildings and driveways should be kept as far as possible from the steep slopes along the east and west sides of the site, and buildings should be located in a pattern that avoids the appearance of a continuous wall atop this presently attractive land mass.

(b) Under the R-25 zoning this complex site would probably not support more than 25 or 30 single-family residences. It is not clear how a more desirable environment would be attained by 168 units on the same site.

(c) Because of the poor soil conditions of the site, public sewers would have to be extended to serve the site for any residential development, regardless of density. There would be no efficiencies that would result in lower housing costs.

(d) The existing undeveloped site, together with the adjacent Lucas Woods to the south, is a significant and attractive natural feature in this part of the City, as viewed from both sides of the Thames River and from the River itself. It is not clear how this feature will be enhanced in appearance and how its natural features will escape destruction or degradation by the proposed use of the site.

(e) It is not clear how the proposed use of the site represents a new approach to living environment.

(f) The proposed use would be incompatible with surrounding residential uses.

(g) Regardless of development stages, it is difficult to envision a "proper and desired urban character" evolving on this site under the proposed development plan.

Lucas Park Road is inadequate to meet the needs of traffic generated by the proposed use. Approximately 47 residences depend on Lucas Park Road for access, generating an estimated 473 vehicle trips per average week day on this substandard street.* (Also see **Transportation Review** section)

The proposed use would add an additional 984 vehicle trips per average weekday to the street, approximately tripling the present traffic. The width of the street's paved surface ranges, generally, from 15 to 20 feet, although the travelway narrows to as little as 13 feet in at least one location.

Recommended standards for streets in residential subdivisions call for a paved width of 30 feet for any street serving more than 150 homes.**

Furthermore, CONNDOT standards suggest that not more than 20 homes should be served by a dead-end street.*** Lucas Park Road is a dead-end street beyond Gates Road, and there are already 17 homes on the dead-end part of this street. Adding 168 units on the proposed site, would result in nine times the recommended units being allowed, as measured by the CONNDOT standard.

The applicant should demonstrate how he proposes to avoid the conditions in Section 13.6.2 of the Zoning Ordinance that would require a denial of density increases in the proposed development.

Finally, it is no where apparent that the proposed plan has considered solar access. Maximum solar access is obtained by an east-west orientation of buildings. It has been demonstrated that the east-west orientation of the longer dimension of a building significantly increases natural solar heating. The proposed development plan indicates that all of the buildings would be oriented north/south, eliminating the opportunity for convenient solar access.

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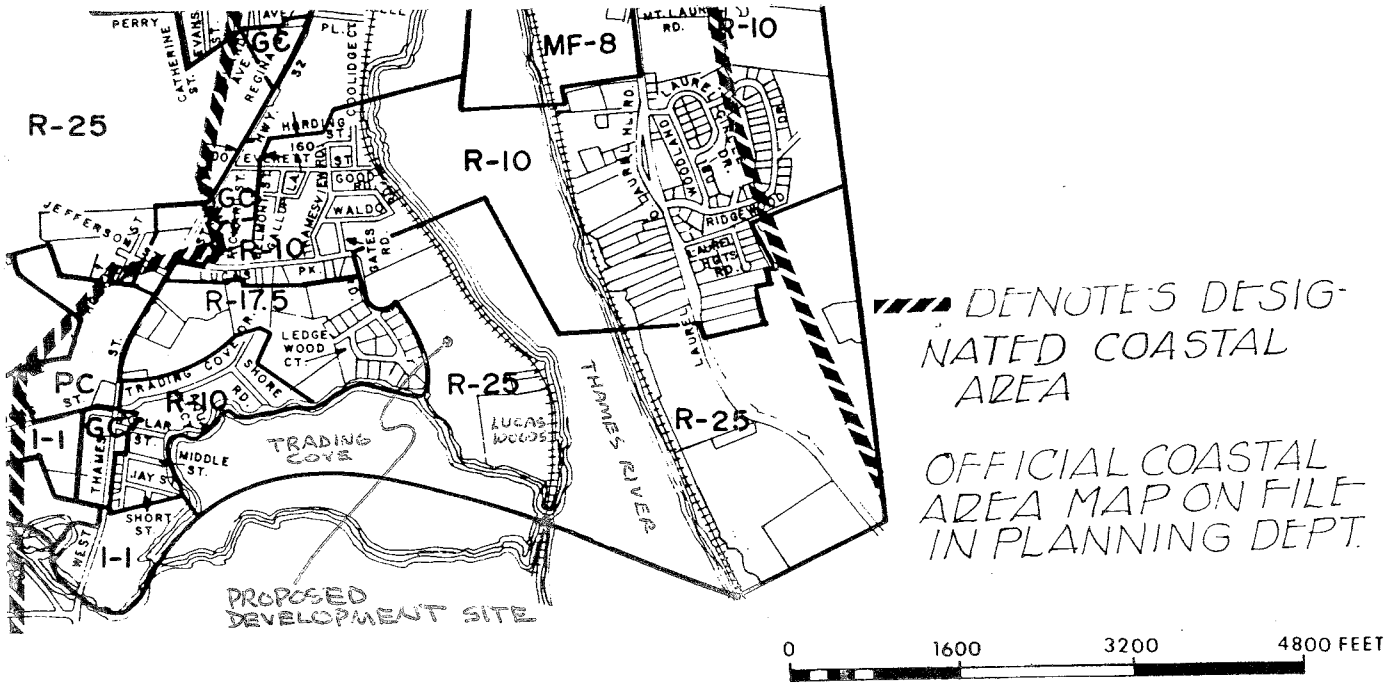
* Based on data provided by TRIP GENERATION, Institute of Transportation Engineers, 4th edition, 1987.

** See GUIDELINES FOR SUBDIVISION STREETS, CONNDOT, January, 1987.

*** Ibid., See 16-3.14.

ZONING MAP



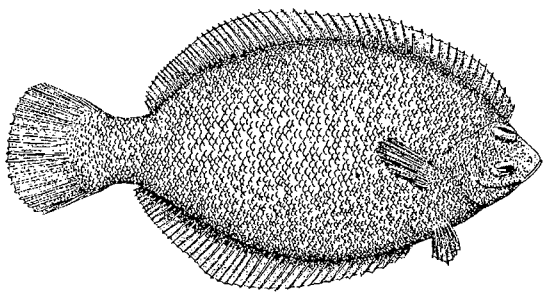
11. TRANSPORTATION REVIEW

The steep topography presents some difficulty in design and construction of the southerly access road at the end of the Lucas Park Road cul-de-sac. The "fill" portion of the proposed access road should be examined for possible encroachment onto regulated areas of Trading Cove. Potential impacts include but are not limited to sediment and erosion, wetlands and archaeological resources.

An analysis of peak-hour trips indicates that the proposed development will generate approximately 75 a.m. and 75 p.m. trips. Average Daily Traffic (ADT) on Route 32 near Lucas Park Road is approximately 8,000 vehicles (1987 counts). Traffic impacts on Route 32 from the proposed development will not be severe. However, a State Traffic Commission review is necessary. Coordination with ConnDOT's District II Maintenance Office is also necessary to determine any permit requirements for encroachment onto the State right-of-way.

The consultant should reconsider the internal roadway network design. The current proposal might present difficulties for winter maintenance and for access by emergency vehicles, especially if the cul-de-sac access is not constructed until the final phase. A possible solution is to widen all roadways to 24 feet and provide two-way travel throughout.

It is advisable for the City of Norwich to investigate the impact of heavy trucks and construction equipment on Lucas Park Road and the resulting need for improvements/upgrading of the local roadway.



12. ARCHAEOLOGICAL REVIEW

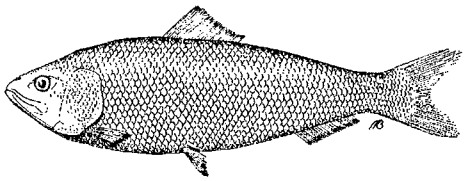
A review of the State of Connecticut Archaeological Site Files and Maps show no prehistoric occupations within the boundaries of the proposed project area. Normally the rugged terrain of the area would suggest that Native American settlements would be rare, however, the vantage point of the area as a lookout and defensive position and its proximity to Fort Shantok, an 18th century Moghegan Indian fortification, would appear to give the area a high probability of early historic encampments.

The land use pattern of high triangular terraces is supported at Fort Shantok where the site location is approximately 60 feet above the surface of the Thames River and 600 feet along its north-south midline and above 300 feet east-to-west at its southern base. On the east, the steep-sloped terrace, outside the palisade, served as trash disposal areas and are known to contain artifactual material. The project area has a similar terrace and its proximity to both the Thames River and Trading Cove would make it an important place for the procurement of natural resources. Trading Cove obtained its name from earlier Indian-European trade relationships. This historic documentation and site provenience emphasizes the archaeological sensitivity of the project area.

On-site inspection located no above-ground structures. However, the walk-over field survey was limited and subsurface testing is highly recommended to locate and identify any prehistoric and historic occupations. The extent of the proposed development project would have an adverse effect on any cultural resources in the area.

A professional archaeological reconnaissance survey is strongly recommended. High potential areas include the hilltop and areas bordering Trading Cove. All archaeological studies should be undertaken in accordance with the Connecticut Historical Commission's **Environmental Review Primer for Connecticut's Archaeological Resources.**

In summary, the project area is located in an extremely critical area of importance to Mohegan Indian lifeways. Proximity to Fort Shantok and the trading relationships around the cove and river suggest a high probability for archaeological resources. It is strongly recommended that all feasible efforts be undertaken to identify and ensure the preservation and conservation of the cultural resources in the area.



ABOUT THE TEAM

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a varety of federal, state and regional agencies. Specialists on the Team include geologists, biologists, foresters, soil specialists, engineers and planners. The ERT operates with state funding under the supervision of the Eastern Connecticut Resource Conservation and Development (RC&D) Area — an 86 town region.

The services of the Team are available as a public service at no cost to Connecticut towns.

PURPOSE OF THE TEAM

The Environmental Review Team is available to help towns and developers in the review of sites proposed for major land use activities. To date, the ERT has been involved in reviewing a wide range of projects including subdivisions, landfills, commercial and industrial developments, sand and gravel excavations, elderly housing, recreation/open space projects, watershed studies and resource inventories.

Reviews are conducted in the interest of providing information and analysis that will assist towns and developers in environmentally sound decision-making. This is done through identifying the natural resource base of the project site and highlighting opportunities and limitations for the proposed land use.

REQUESTING A REVIEW

Environmental reviews may be requested by the chief elected official of a municipality or the chairman of town commissions such as planning and zoning, conservation, inland wetlands, parks and recreation or economic development. Requests should be directed to the chairman of your local Soil and Water Conservation District and the ERT Coordinator. A request form should be completely filled out and should include the required materials. When this request is approved by the local Soil and Water Conservation District and the Eastern Connecticut RC&D Executive Council, the Team will undertake the review on a priority basis.

For additional information and request forms regarding the Environmental Review Team please contact the ERT Coordinator: **203-345-3977, Eastern Connecticut RC&D Area, P.O. Box 70, Haddam, Connecticut 06438.**