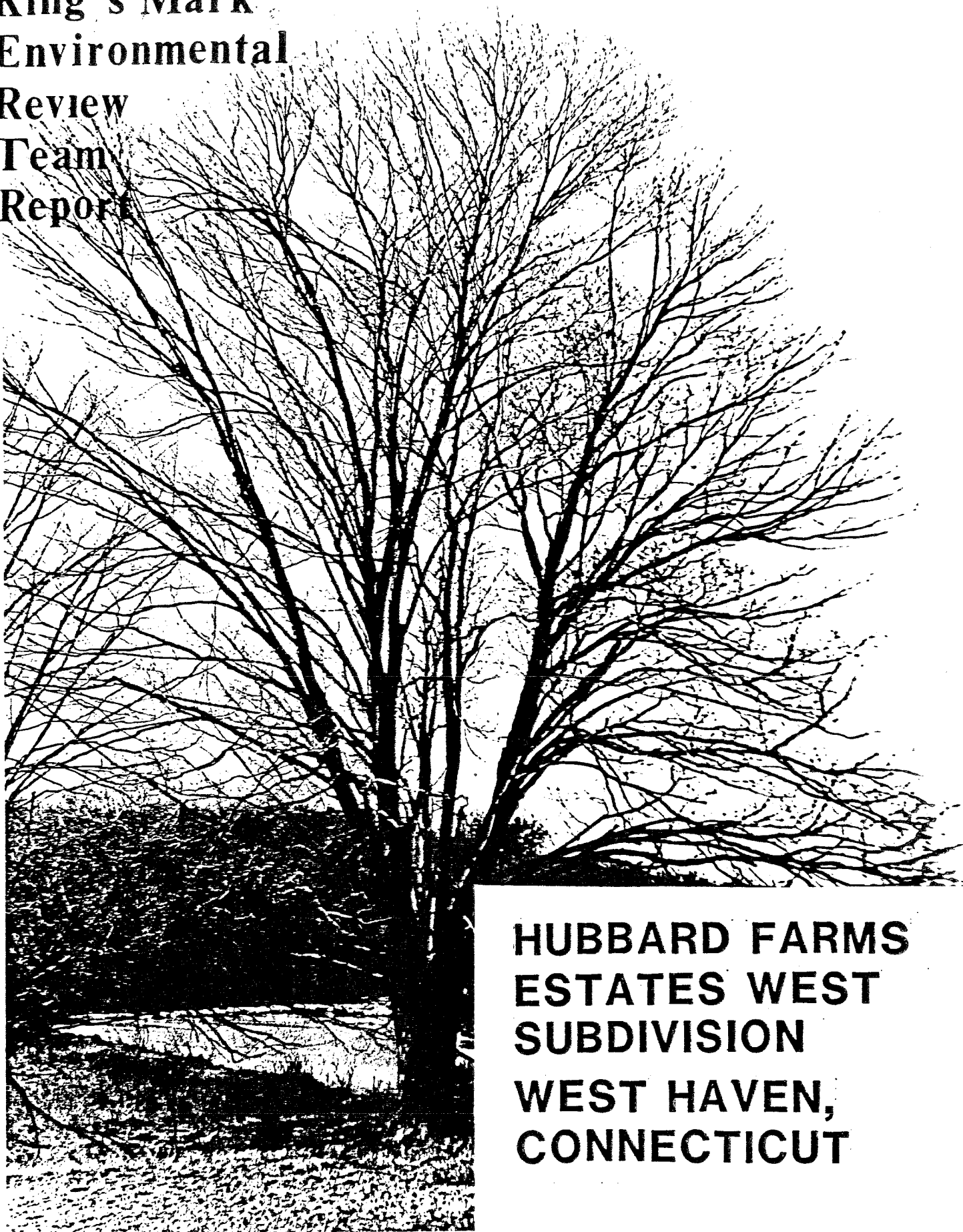


**King's Mark
Environmental
Review
Team
Report**



**HUBBARD FARMS
ESTATES WEST
SUBDIVISION
WEST HAVEN,
CONNECTICUT**

HUBBARD FARMS ESTATES WEST SUBDIVISION

WEST HAVEN, CONNECTICUT

Environmental Review Team Report

Prepared by the King's Mark Environmental Review Team
of the King's Mark Resource Conservation
and Development Area, Inc.

Wallingford, Connecticut

for the

West Haven Conservation Commission

This report is not meant to compete with private consultants by supplying site designs or detailed solutions to development problems. 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 Conservation Commission and the City. The results of the Team action are oriented toward the development of a better environmental quality and long-term economics of the land use. The opinions contained herein are those of the individual Team members and do not necessarily represent the views of any regulatory agency with which they may be employed.

FEBRUARY 1988

ACKNOWLEDGMENTS

The King's Mark Environmental Review Team Coordinator, Nancy Ferlow, would like to thank and gratefully acknowledge the following Team members whose professionalism and expertise were invaluable to the completion of this study:

- * William Warzecha, Hydrogeologist
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USDA - Soil Conservation Service
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- * Judy Wilson, Wildlife Biologist
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South Central Regional Council of Governments

I would also like to thank Susan Anderson, Secretary for the King's Mark Environmental Review Team for assisting in the completion of this report.

Finally, special thanks to Gloria Ireland, West Haven Conservation Commission and Samuel Livieri, developer, Ken Vozzo, engineer for the developer, Tim Yolen, attorney for the developer, Bruce Laskey, soil scientist for the developer, and Bruce Donohue, environmental consultant for the developer, for their cooperation and assistance during this environmental review.

EXECUTIVE SUMMARY

Introduction

The West Haven Conservation Commission has requested that an environmental review be conducted on Hubbard Farms Estates West, a site proposed for a subdivision development. The site is located in the southwestern corner of town, bordering the town of Orange. The 48-acre site is characterized by second growth, mixed hardwood forests, wetlands, and an open field. There are three major wetlands on the site. The proposed subdivision would encompass 140 house lots, ranging in size from 8,048 square feet to 34,012 square feet. Several access roads are proposed to serve the subdivision. A number of wetland crossings are proposed, including a crossing of the East Branch of the Oyster River. The subdivision would rely upon municipal sewers and water.

The Town was primarily concerned with the potential impact that the proposed development would have on: (1) existing natural resources; (2) erosion and sedimentation; (3) wetland and wildlife resources; and (4) site design compatibility. Therefore the Town asked the ERT to inventory on-site resources and determine their suitability for the proposed development.

The review process consisted of four phases: (1) inventory of the site's natural resources; (2) assessment of these resources; (3) identification of resource problem areas; (4) presentation of planning and land use guidelines. Based on the review process, specific resources, areas of concern and development limitations and opportunities were identified. The major findings of the ERT are presented below:

Setting and Land Use

Hardwood forest covers most of the site. Approximately one third of the site is wetland. Land uses to the north, east and south are high density residential. To the west, land use is industrial development. Houses and roads are planned in a portion of the wetlands. According to City officials, a 25 foot buffer zone is required from wetland areas.

Topography

The land surface slopes gently toward the rivers. Some areas of moderate to steep relief are present. Elevations range from approximately 20 feet to 100 feet above mean sea level.

Geology

No bedrock outcrops were visible during the field review. Depth to bedrock is approximately 54 feet in one section of the site and unknown on the remainder. The bedrock under the site is identified as Oronoque Schist. According to the surficial geologic map, a glacial sediment called till covers the site. Soil mapping data indicates that another glacial sediment called stratified drift is located in the western sections. A cursory review of the surficial deposits at the western edge of the property revealed stratified drift deposits. Further testing would be needed to confirm the extent of the deposits. These deep sandy soils present less of a problem in terms of development than do till soils which have a hardpan. Sandy soils have the potential for cutback cave-ins while till soils seep above the hardpan. Both are difficult to stabilize with vegetation.

Alluvial soils parallel the rivers. These deposits have low potential for development due to high water tables and frequent flooding. The wetland in the eastern section is formed by poorly to very poorly drained soils over glacial till. These soils have a seasonally high water table and a slowly permeable layer which may pose engineering problems. Areas identified as wetland soils are considered "regulated areas". Activities that impact this area require approvals from the Conservation Commission and may require permits from the Army Corps of Engineers. A DEP diversion permit may be required for the detention basins.

Hydrology

The central and eastern portions of the site drain to the East Branch of the Oyster River. The west drains to the Oyster River. Because of the high density of lots proposed, the subdivision will be expected to increase the amount of runoff. The stormwater management plan should be reviewed by the City Engineer. Due to the proximity of the Oyster River, on-site detention may not be necessary. If detention basins are needed, they should be located on upland soils rather than wetland soils. Protection of the wetlands and watercourses from silt and road sand is a concern. Ideally, stormwater should be outletted to a sedimentation basin rather than the watercourses. Considerations for the maintenance of catch basins and detention/sedimentation basins on a regular basis are important.

The availability of public water and sewer lines will help to allay some of the hydrogeologic impacts. The main concern is the development in the wetland. Almost 2,000 feet of road are planned in regulated wetland soils. Although undesirable, roads through wetlands are feasible provided they are properly engineered. High seasonal water tables are a constraint for house construction. Soil testing to determine the loading rates is needed. Foundations will probably need drains to keep basements dry. An alternative is to build houses without basements. Although engineering methods make construction in wetlands possible, it is still undesirable.

Soil Resources

Inland wetland locations have been mapped by a soil consultant. Small watercourses have not been located on the plans. These are an important limitation to locating roads, driveways and homes. Soil limitations on the site include: poorly drained soils and regulated inland wetland soils. The road crossing over the East Branch of the Oyster River may need further investigation. The amount of fill needed might be reduced through the use of box, bridge or arched culverts. Changes in how water reaches the rivers may impact the floodplain moisture regime.

Sediment and Erosion Control

While the subdivision has a sediment and erosion control plan, several elements are still needed to minimize the effect of erosion and sediment. Some suggestions include: minimize vegetation disturbance and maintain buffer strips around wetlands, keep construction out of wetlands as much as possible, plan for surface drainage, and provide details for storm drainage outlets. In the future the City might consider having a percent buildable area requirement for lots. When most of a lot is wetland, gradual filling by the lot owner often occurs. This activity may create drainage problems for neighbors.

Wetland Considerations

The wetlands on the site are the hillside wetland, the East Branch of the Oyster River wetland and the Oyster River wetland. The hillside wetland provides for some nutrient recycling, pollution filtration and water storage. These functions will be lost due to construction. The City requires a 25 foot buffer zone around wetlands. The proposed development indicates no provision for the buffer zone. As wetland vegetation is replaced by manicured lawns and impervious surfaces, pollutants generated from lawn and winter road maintenance will contribute to the load already existing in the East Branch of the Oyster River. There are sufficient uplands on the site to provide for desirable alternatives with a greatly reduced impact on the wetlands. Alternatives such as multi-family housing, cluster housing or a reduced number of lots can be designed to use the uplands and reduce the impact on the wetlands.

Water Quality Considerations

The water quality for the Oyster River is classified as B/A. It is classified as B because the river runs through an urban area. There are no known wastewater or leachate discharges. The goal is to upgrade the water quality classification to A. The discharge of stormwater to a class A stream is consistent with state policy provided certain conditions are met. Detention/sedimentation basins are considered to provide acceptable stormwater treatment if properly sized and maintained.

Wildlife Considerations

The area is composed of a variety of habitats. Generally the greater the habitat diversity, the greater the variety of wildlife. Wetlands increase the habitat diversity so they are important areas to conserve as open space. Setting aside the wetland area around the East Branch of the Oyster River is a step towards conserving the habitat. A buffer of 100 feet is recommended around any wetland. Whatever the area set aside for open space, it is important that wildlife be able to travel from one section to another unimpeded.

As with any development, impacts on wildlife tend to be negative. Steps may be taken to minimize the impact on the wildlife, and a backyard wildlife program can be encouraged. Alternatives such as larger house lots or clustered houses with areas of open space could minimize the impacts.

Threatened and Endangered Plant and Animal Species

According to the DEP - Natural Diversity Database there are no Federally listed Endangered Species or Connecticut "Species of Special Concern" that occur within the study area.

Planning Considerations

Development in the wetlands is of concern. The Conservation Commission Regulations condition issuance of wetland permits on a number of factors including alternatives. Cluster housing or a reduced number of lots may offer a reasonable development alternative. Discussion of cluster options included

the developer PDD Alternate. The hostile multi-family development environment and the surrounding land use were given as reasons to avoid this option. The densities in the developer proposal are high and the mixed single and multi-family development might be confusing. Single family attached housing at densities equal to the underlying zoning may be received favorably. The non-wetland west and southwest portions present clustering potential. The area adjacent to Island Lane could be used for conventional single family development.

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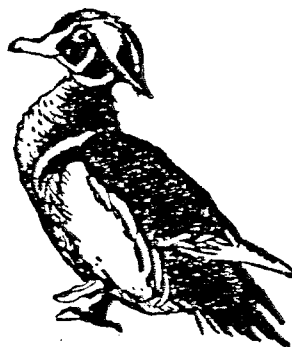
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INTRODUCTION



The review process consisted of four phases:

- (1) Inventory of the site's natural resources (collection of data).
- (2) Assessment of these resources (analysis of data).
- (3) Identification of resource problem areas.
- (4) Presentation of planning and land use guidelines.

The data collection phase involved both literature and field research. The ERT field review took place on January 20, 1988. Field review and inspection of the proposed development site proved to be a most valuable component of this phase. The emphasis of the field review was on the exchange of ideas, concerns or alternatives. Mapped data or technical reports were also perused and specific information concerning the site was collected. Being on site also allowed Team members to check and confirm mapped information and identify other resources.

Once the Team members had assimilated an adequate data base, it was then necessary to analyze and interpret their findings. The results of this analyses enabled the Team members to arrive at an informed assessment of the site's natural resource development opportunities and limitations. Individual Team members then prepared and submitted their reports to the ERT Coordinator for compilation into the final ERT report.

The primary goal of this ERT is to inventory and assess existing natural resources occurring on the site as well as providing planning information. Specific objectives include:

- (1) assessment of the hydrogeologic characteristics of the site, including development limitations and stormwater hydrology;
- (2) determination of the suitability of existing soils to support the proposed development;
- (3) discussion of soil erosion and sedimentation concerns;

Figure 1

LOCATION OF STUDY SITE

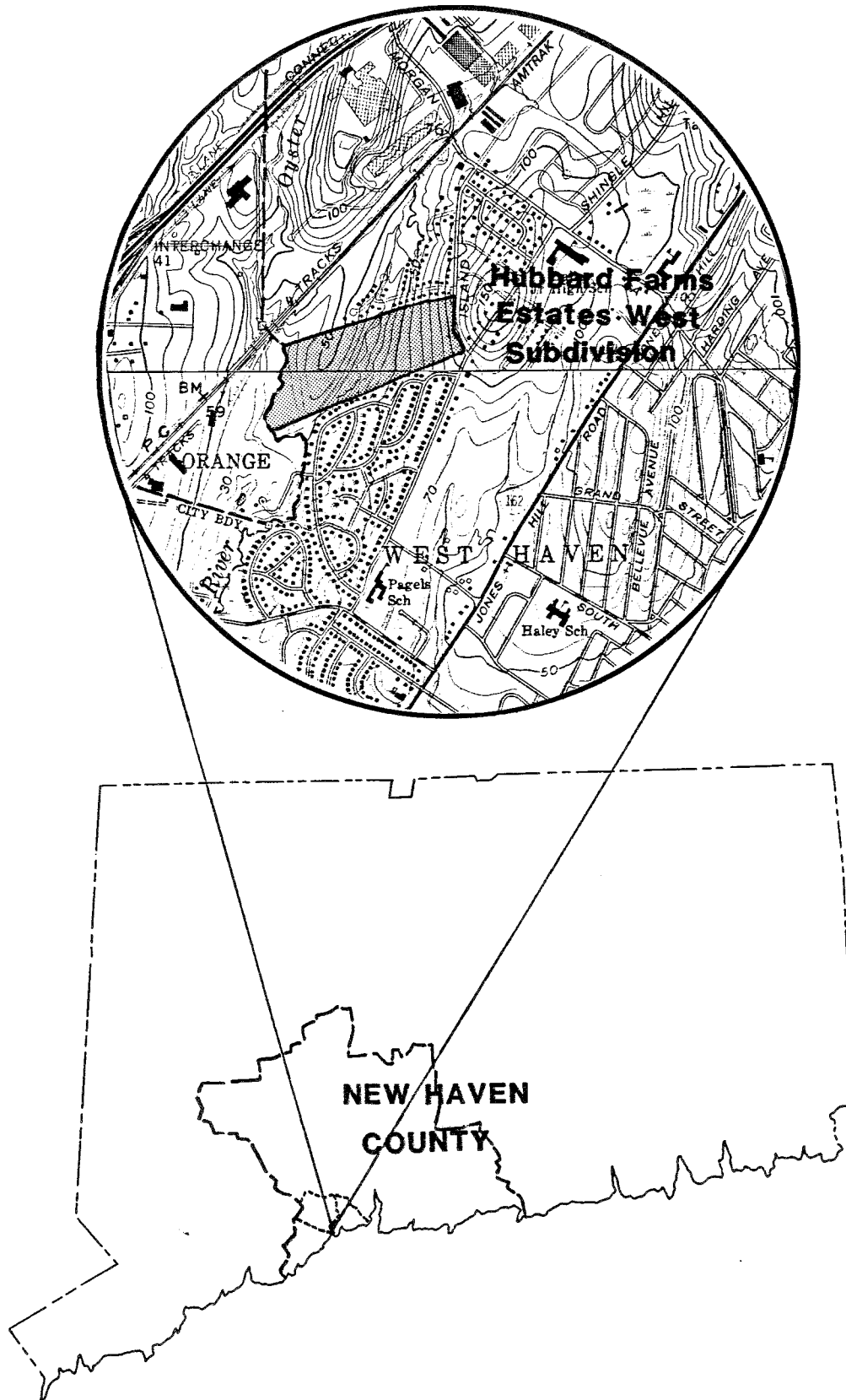
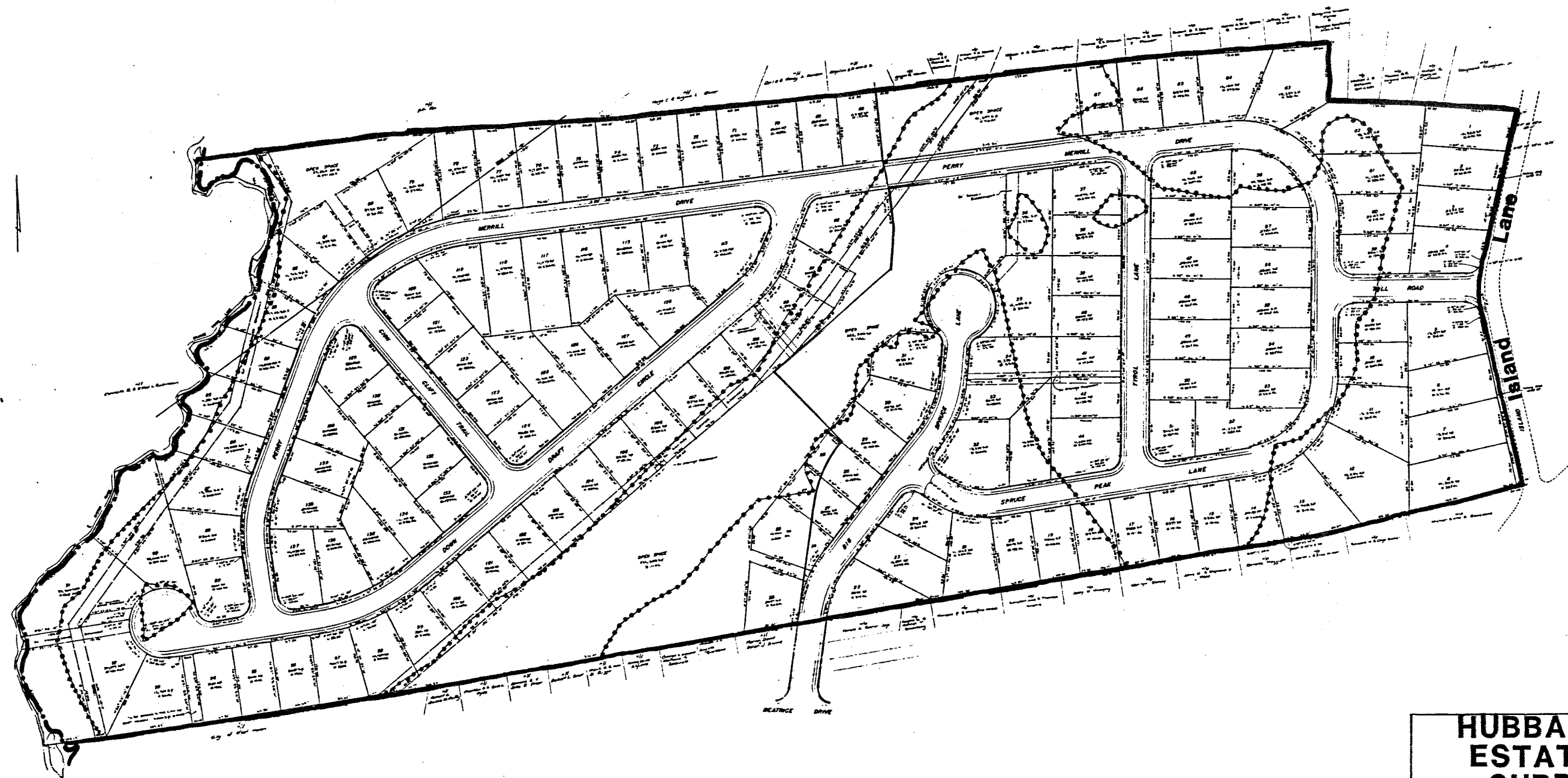


Figure 2



WETLAND BOUNDARY

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**PROPOSED
SUBDIVISION**

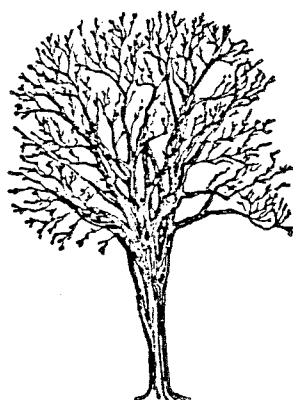
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- (4) assessment of the impact of the development on the wetlands and rivers;
- (5) assessment of the impact of the development on the wildlife/habitat. and;
- (6) assessment of planning and land use issues.

PHYSICAL CHARACTERISTICS



SETTING AND LAND-USE

The proposed Hubbard Farms Estates West subdivision site, approximately 48 acres in size, is located in southwestern section of West Haven at the Orange town line. The site abuts Island Lane on the east, Beatrice Drive on the south, Oyster River and Orange town line on the west and numerous residential properties on the north. The East Branch of Oyster River and its accompanying floodplain traverses the central parts of the site in a southwesterly direction.

The northwest corner of the site is located in a M-2 zone while the remainder comprises an R-2 zone. Permitted uses in the M-2 zone include medium manufacturing, while the R-2 allows single family homes on a minimum lot size of 8,000 square feet. It is understood that the applicant wishes to change the M-2 zone to the R-2 zone. The proposed subdivision would be served by municipal water and sewer lines.

The site is characterized mainly by mixed hardwood forests. Land-uses north, east and south of the site are mainly high density residential. Industrial/manufacturing land uses characterize the land to the west.

Based on the site plan submitted to Team members on the review day, approximately one-third or 14 acres of the site consists of regulated inland-wetland/floodplain soils. Regulated floodplain soils parallel Oyster River and the East Branch of Oyster River. The applicant's soil scientist has mapped a relatively large area of wetland soils in the eastern section of the site. Present plans indicate that about 38 house lots or parts thereof and approximately 1,300 feet of road (mainly Tyrol Lane and Spruce Peak Lane) will be constructed over this wetland area. About 550 feet of road (Perry Merrill Drive) is proposed over the East Branch of the Oyster River and its floodplains

in the northcentral section. The rear portions of several lots back up on floodplains of the Oyster River and the East Branch of Oyster River. According to Town Officials, a 25 foot setback (buffer zone) is required from wetland areas.

TOPOGRAPHY

The land surface and the site slopes gently towards Oyster River or East Branch of Oyster River. Some areas of moderate to steep relief are concentrated along the land flanking the East Branch of Oyster River and Oyster River in the western section.

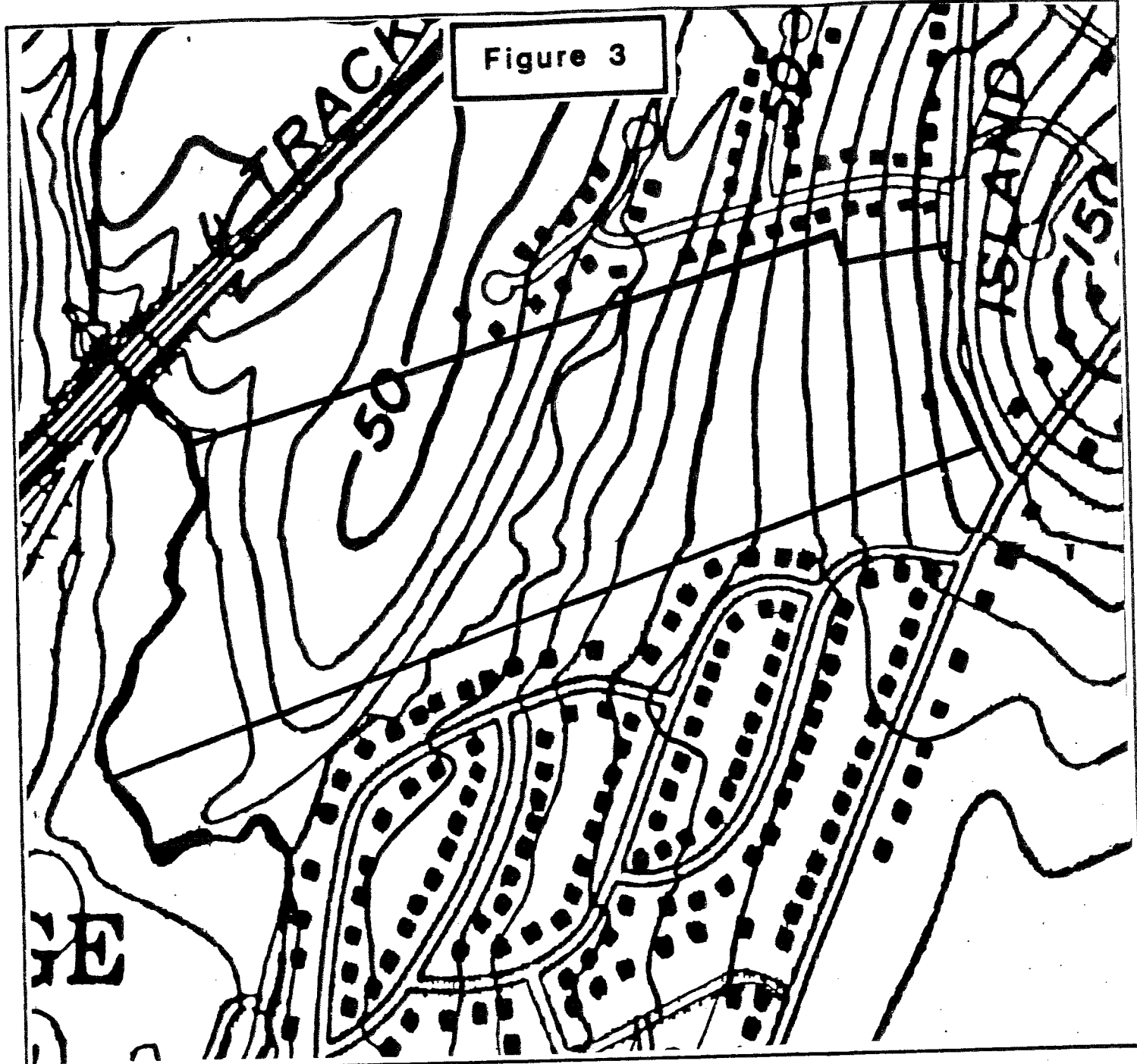
Site elevations range from a high of 100 feet above mean sea level at the eastern limits to about 20 feet above mean sea level along Oyster River in the western section (Figure 3).

GEOLOGY

The site is located within the New Haven and Woodmont topographic quadrangles. A surficial geologic map of the quadrangle (QR-18 by Richard Foster Flint) has been published by the Connecticut Geological and Natural History Survey. No bedrock geologic map has been published to date. The Team's geologist referenced John Rodgers' "Bedrock Geological Map of Connecticut" for bedrock geologic information.

No bedrock (ledgerock) outcrops were visible during the field review. The log of a domestic water supply well located in the eastern limits of the site (formerly the Cockran Property) penetrated 54 feet of unconsolidated material before encountering bedrock. Depth to the bedrock surface is unknown on the remainder of the site.

Figure 3



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TOPOGRAPHY

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Rodgers has identified bedrock below the site as Oronoque Schist (Figure 4). It consists of gray to silver, medium to fine grained schist and granofels. Schists and granofels are metamorphic rocks; that is, they have been geologically altered by great heat and pressure within the earth's crust. "Schists" are generally cleavable rocks with layers (folia) defined by the parallel arrangement of platy or flaky minerals. "Granofels" are similar to a schist except that they have little or no foliation.

Because the depth to bedrock on the site appears to be quite deep throughout, the underlying bedrock should pose no major problems with respect to the proposed subdivision.

According to Flint's surficial geologic map (map QR-18), the surficial geologic or unconsolidated material overlying bedrock on the entire site is till (Figure 5). Till is a glacial sediment that was deposited directly from an ice sheet. It consists of a generally non-sorted, structureless mixture of clay, silts, sand, gravel and boulders. The texture of the till may vary greatly from place to place. The Team's soil scientist has indicated that the texture of the till in the eastern section of the site is generally sandy, stony and loose in the upper 1.5 to 2.0 feet; below that depth it becomes a more compact, slightly finer grained till. The latter often results in a seasonally high water table. Also, the compact zone also has a slowly permeable medium.

It should be pointed out that there is a discrepancy between map QR-18 and the Soil Survey for New Haven County. As mentioned earlier, QR-18 shows till covering the entire site. Soil mapping data identified sandy soils derived from glacial stratified drift covering the area between Oyster River and the East Branch of Oyster River in the western section. A cursory review of the surficial deposits at the western limits by Team members revealed stratified drift deposits. Stratified drift, also a glacial sediment, was deposited by

glacial meltwater streams during the ice retreat in the Oyster River Valley. Sand and gravel are the major components of stratified drift. Further testing with a backhoe or auger would be required in order to accurately substantiate the type of deposits (till or stratified drift) that covers the upland area in the western section. Deep, sandy soils would be less problematic from a development standpoint than, for example, till soils characterized by a "hardpan" layer and seasonally high water table.

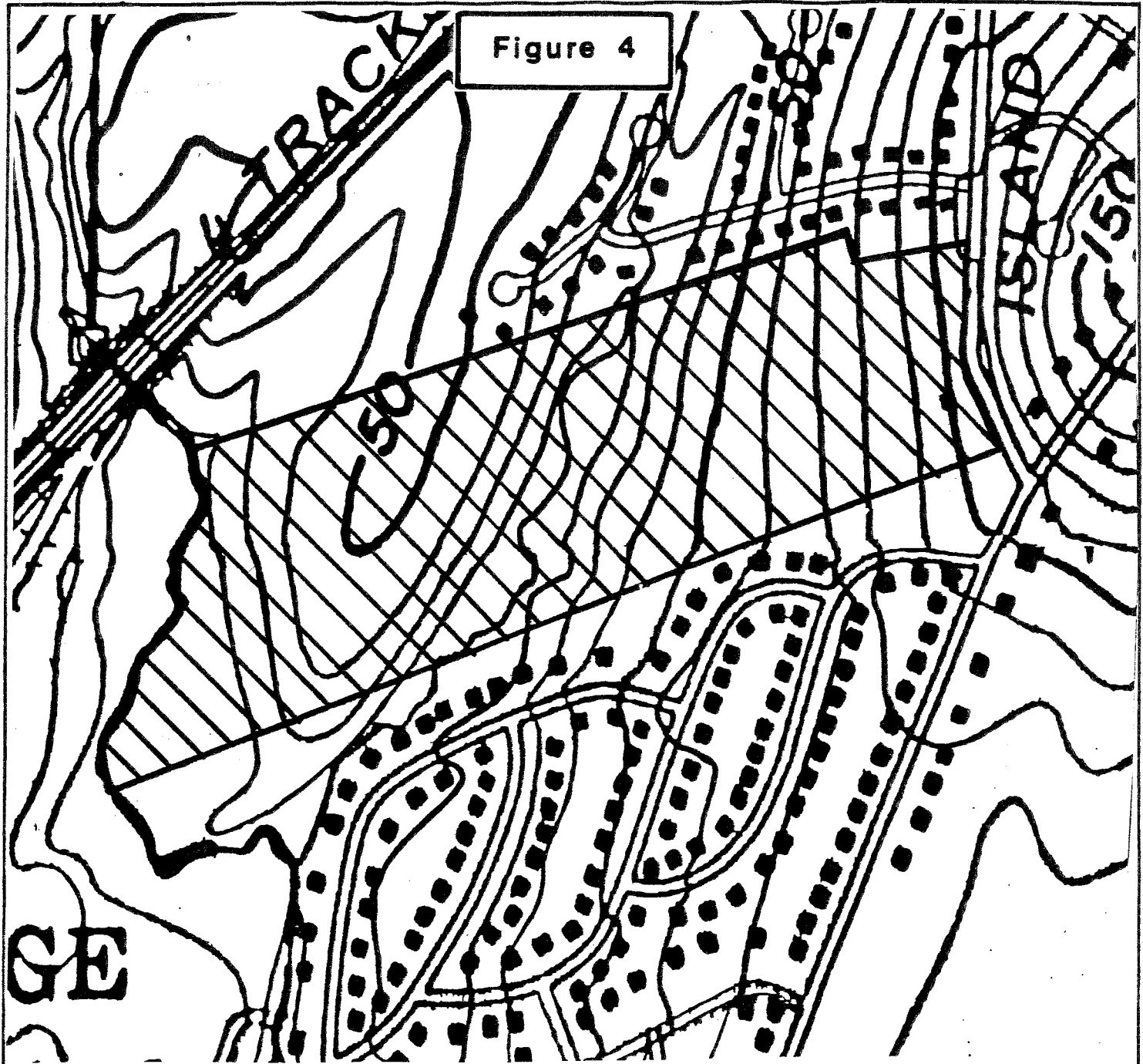
A major concern for the installation of sewers, waterlines and electrical lines is the potential for "cutback" cave-ins in sandy soils. Proper shorings of sides should be accomplished in deep trenches (5 feet or greater). Because sandy soils are typically droughty, it is often difficult to stabilize slopes with vegetation.

Deep cuts into "hardpan" soil can also be very difficult. Because of the seepage of water on top of the hardpan layer, it is very difficult to stabilize slopes in these areas. The water creates an unstable condition just below the seepage line. The weight of the saturated soil causes the soil to flow down the slope. Stabilizing and establishing a vegetative cover on these eroding slopes is extremely difficult.

Bands of alluvial soils parallel the Oyster River and the East Branch of Oyster River. "Alluvial deposits" consist of sand, silt and gravel, which occur as a thin cover on valley floors. Because of high water tables much of the year and because of frequent flooding, these areas have very low potential for development purposes. In addition, these soils have a great capacity for carrying flood waters.

The other wet area on the site is in the eastern section. It is comprised of poorly to very poorly drained wetland soils that are found mainly in drainageways and depressional features on the upland till soils. The water

Figure 4



ORONOQUE SCHIST

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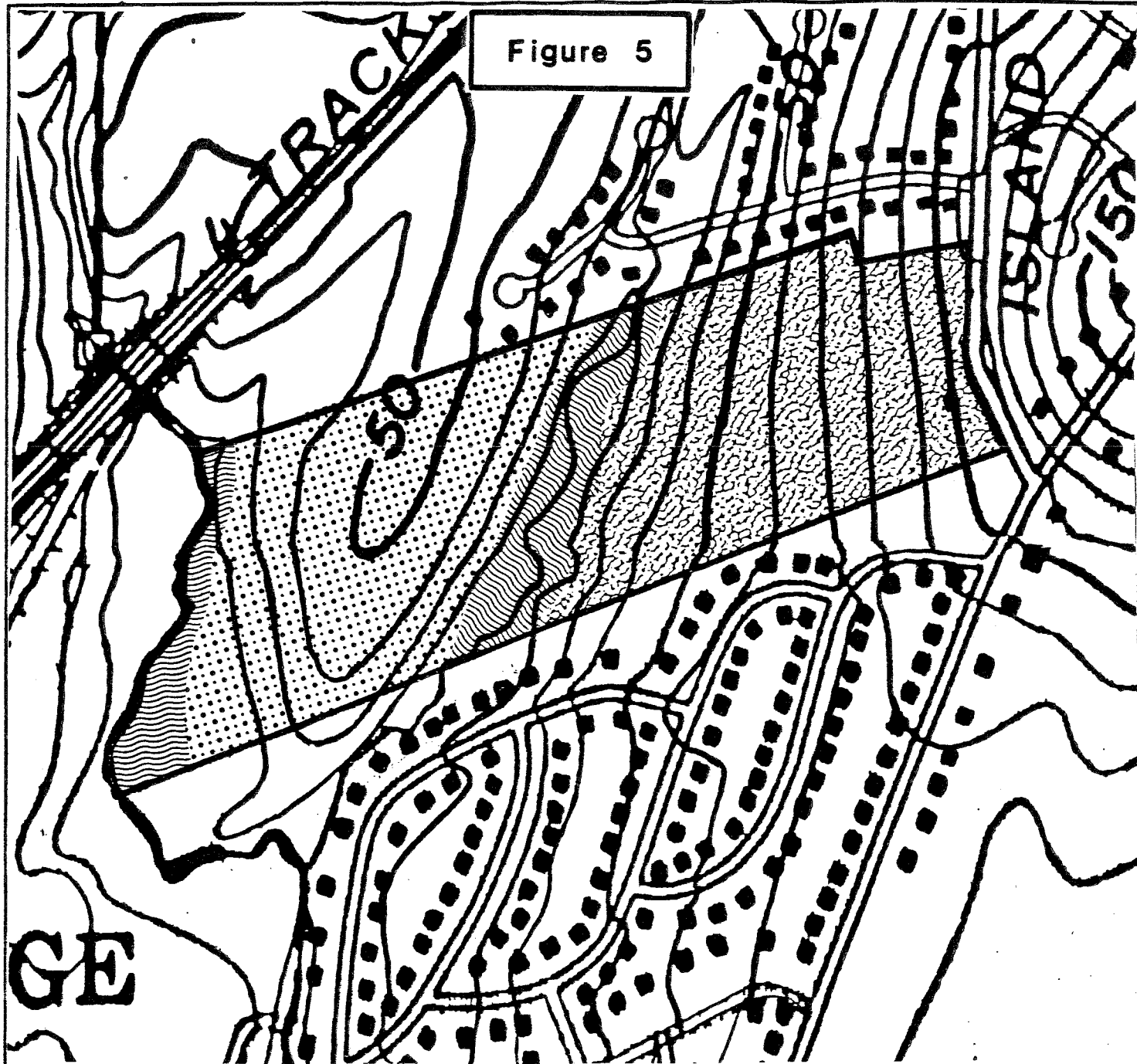
**BEDROCK
GEOLOGY**

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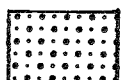
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Figure 5



TILL



STRATIFIED DRIFT



ALLUVIUM

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GEOLOGY**

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conditions in this area fluctuate seasonally and in response to precipitation. During the field review, which was conducted during heavy rain, several of the streamcourses in the wetland area were experiencing moderate flow conditions. It is estimated that these streamcourses range from about 0.5 to 2.0 feet deep in during peak flow conditions. The texture of the soils and presence of shallow mottling is indicative of a seasonally high water table. The water table in this area is probably at or near ground surface from November to May. The major engineering concerns with soils in this area are the seasonally high water table and a slowly permeable soil layer, at depth ranging from about 16-20 inches below ground surface. Any construction in these areas poses engineering problems.

The flood control attributes and sediment retention capabilities of the wetland probably range from fair to good. The best areas would be those which have gradients that are flat and relatively wide. The streamcourses, which have steep gradients serve as conduits for surface runoff to adjacent, larger floodplains and streamcourses.

All areas identified as wetland soils are considered "regulated areas" under Chapter 440 of the Connecticut General Statutes. Any proposed activity that impacts regulated areas must be approved by the West Haven Conservation Commission. In reviewing a proposal, the Commission will need to determine the impact that the proposed activity will have on the wetland. If the Commission feels that the regulated areas are serving an important hydrologic or ecologic function and that the impact of the proposed activity will be severe, they may deny the activity altogether or, at least, require measures that would minimize the impact. The U.S. Army Corps of Engineers should be contacted as they may require a permit for crossing the East Branch of Oyster River and the filling that will be required for the construction of houses and roads in the eastern section. A diversion permit may also be required for the detention basins.

HYDROLOGY

The central and eastern portions of the site drain to East Branch of Oyster River, a perennial tributary which flows in a southerly direction to Oyster River (Figure 6). The headwaters of the East Branch of Oyster River are located in a swamp between Bailey Jr. High School and Shingle Hill, northeast of the site.

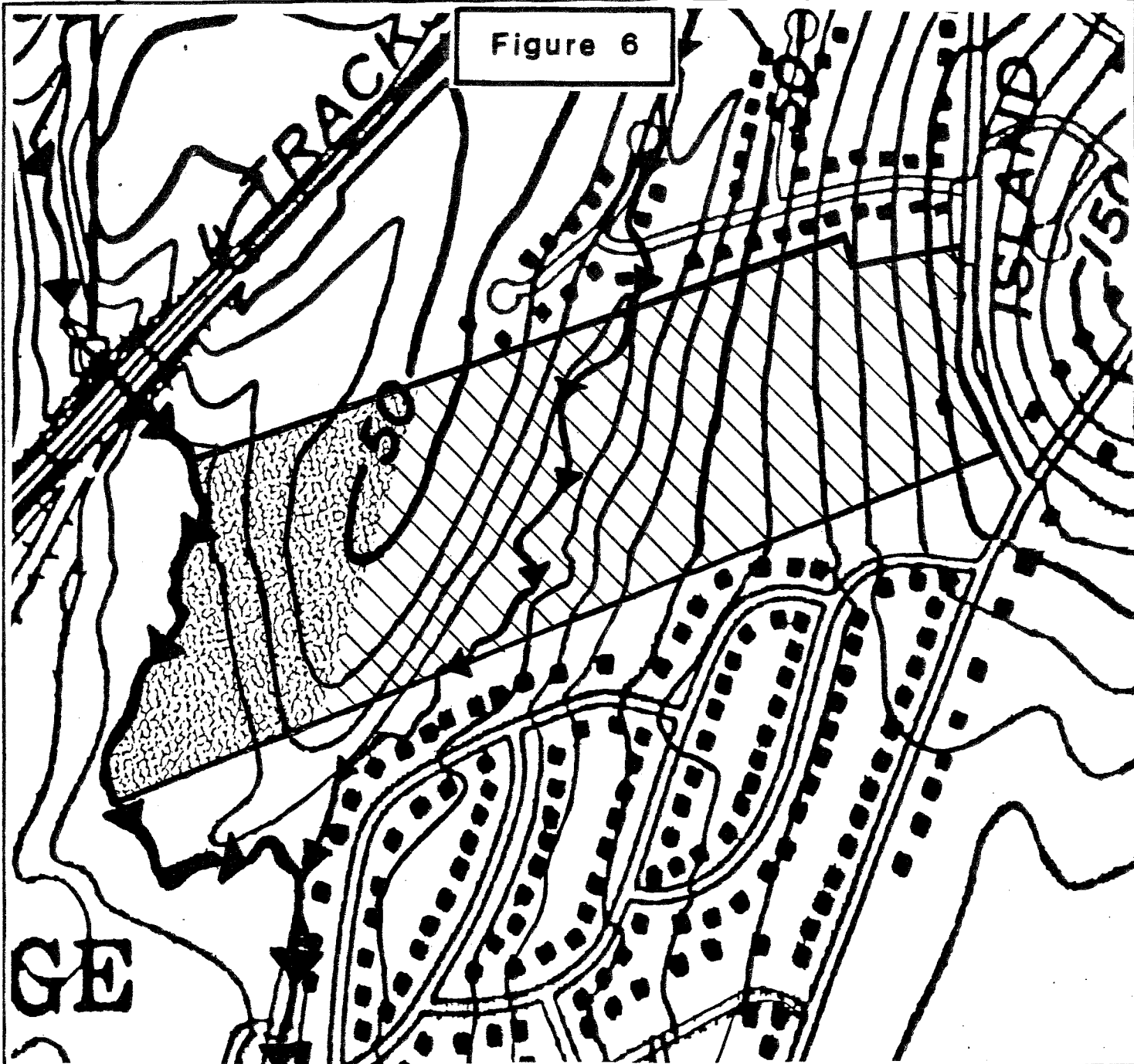
Surface runoff in the western portions flows downslope to Oyster River and its accompanying floodplain. Oyster River ultimately discharges into Long Island Sound.

Because of the high density of house lots presently proposed, development of the site would be expected to increase the amount of runoff during periods of rainfall. These increases would result from soil compaction, removal of vegetation and placement of impervious surfaces (roof tops, driveways, etc.) over permeable soils. The stormwater management plan, which includes pre- and post-development runoff calculations, should be carefully reviewed by the City's engineer and appropriate town officials.

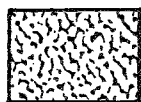
Considering the site's close proximity to Oyster River, on-site detention may not be necessary. If stormwater from the site is detained during rainy periods and released at a point in time when the Oyster River is experiencing peak flow conditions, existing flooding problems downstream could be further aggravated. It might be wise to get the stormwater off of the site as quickly as possible. If stormwater detention basins are needed, they should be located on upland soils rather than in floodplain or wetlands areas. These areas already have some natural abilities to store stormwater.

The protection of watercourses on the site from silt and road sand is a major concern. In this regard, a comprehensive erosion and sediment control plan would be essential to the assessment of the development, particularly in

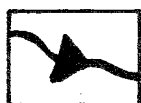
Figure 6



Portion of the site draining to
the east branch of Oyster River



Portion of the site draining
to the Oyster River



Watercourses showing
direction of flow

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view of the silty soils and seasonal seeps (high water table) in the eastern section. The applicant's engineer needs to show in the stormwater management plans where road drainage will outlet. Ideally, it should be outletted to a sediment basin on the site rather than directly to watercourses.

Considerations for the maintenance of catch basins and detention/sediment basins on a regular basis are also important. Finally, close examination of all downstream culverts for proper sizing is warranted.

The availability of public water and sewer lines will help to allay some of the hydrogeologic impacts commonly associated with residential development. However, the major hydrogeologic concerns that remain at issue are the construction of roads and homes currently proposed in the wetland in the eastern section.

As mentioned earlier, almost 2,000 feet of road will need to cross regulated wetland soils. Although undesirable, wetland road crossings are feasible provided they are properly engineered. These roads need to be constructed adequately above the surface elevation of the wetland. This will permit better drainage of the road and also decrease the frost heaving potential. Road bed preparation needs to include removal of all organic material before the fill material is placed. In cut areas, underdrains should be installed on either side of the road. Road construction through wetlands should preferably be done during the dry time of the year, and should include provisions for effective erosion and sediment control. Culverts should be properly sized and located so as not to alter the water levels in the wetland or cause flooding problems. Finally, the U.S. Army Corps of Engineers should be contacted to determine if a permit is required for the proposed activity.

The water table in the wetland area in the eastern section is probably at or near ground surface for at least 6 months during the year (November to May). This seasonal water table is a pertinent engineering concern in terms of

constructing homes in the area. Soil testing, which includes detailed soil borings, needs to be conducted throughout the wetland area to determine soil textures and depth to the water table. Ideally, this testing should be done during the wet time of the year. Also, soil testing to determine the allowable loading rate of soil is needed, if development takes place in this area. It seems likely that all homes constructed in the eastern section will need foundation drainage. All foundations should have both exterior footing drains and an interior underdrain system. Also, because of the wet conditions, water stops should be placed between walls and the footings. Hopefully, this will keep basements dry. An alternative would be to construct houses without basements. Any drainage work that takes place should be monitored through a wet season to ensure that it is effective. Even with the potential engineering measures mentioned above, the construction of buildings in the wetland is highly undesirable. The destruction of the wetland due to draining and filling will take away any of the natural hydrological or ecological functions that it may be presently performing in the drainage area.

SOIL RESOURCES

The landscapes of Hubbard Farms Estates, West are dominated by 2 major landforms. The eastern sideslope is dominated by deep, gently to strongly sloping, glacial till soils with a firm, dense substratum (hardpan) at about a two foot depth. The soils range from well drained to very poorly drained. A band of poorly to very poorly drained alluvial soils along the east branch of Oyster River separates the landforms. The western side is dominated by deep, gently sloping to steep, glacial outwash soils formed in loamy over sandy or gravelly materials. The floodplain of the Oyster River and associated poorly and very poorly drained alluvial soils defines the western boundary.

The soil map included with this report (Figure 7) has been created from on-site investigation, air photo interpretation, and information provided by Northeast Soils. This map can be used for general discussion of soil limitations on this parcel. All discussions about inland wetland locations and boundaries should use the wetlands map generated by surveyed boundaries mapped by Northeast Soils.

Because of the number of map units included, a chart of important soil features and interpretations has been prepared (Appendix A). Below are listed some additional soils information and concerns:

1. Small watercourses have not been located and shown on the plans. They are regulated areas and are an important engineering limitation to locating roads, driveways and homes.
2. Included in the areas mapped AfC is a narrow area of steeper slopes (15%) along the east branch of Oyster River. Also included are small areas of disturbed soils along the sewer line.
3. Included in areas mapped RN are areas of Ridgebury soils on 8 to 15% slopes. Dominant slopes are 3-8%.
4. Included in areas mapped WyC are small areas of well drained soils with loose, sandy substrata. These areas are located at the base of the till sideslope.
5. Included in areas mapped Li are small areas of poorly drained glacial till and outwash soils.
6. Because of the large amount of surface and subsurface water moving downslope on the eastern sideslope, the proposed road/home drainage system may not completely eliminate the seasonal wetness problem. This is particularly true on proposed lots that border the northern and southern property boundaries (62-67, 12-22). Surface and subsurface water does enter the parcel from the surrounding developed areas. Homes with partial basements or no basements may be more practical on many proposed lots.
7. The cul-de-sac and detention basins on the eastern side should be located so that fill slopes will not affect the floodplain wetlands.
8. The road crossing over the east branch of Oyster River needs further investigation and modification. It is recommended that boring data be obtained in this area to find out if the highly variable floodplain soil can support this fill. The amount of fill needed, (and thus impact) could be lessened by the use of a bridge, box culverts or arched culverts.

The following comments relate specifically to the "Environmental Impact Statement and Biological Supplement" prepared for Hubbard Farms Estates.

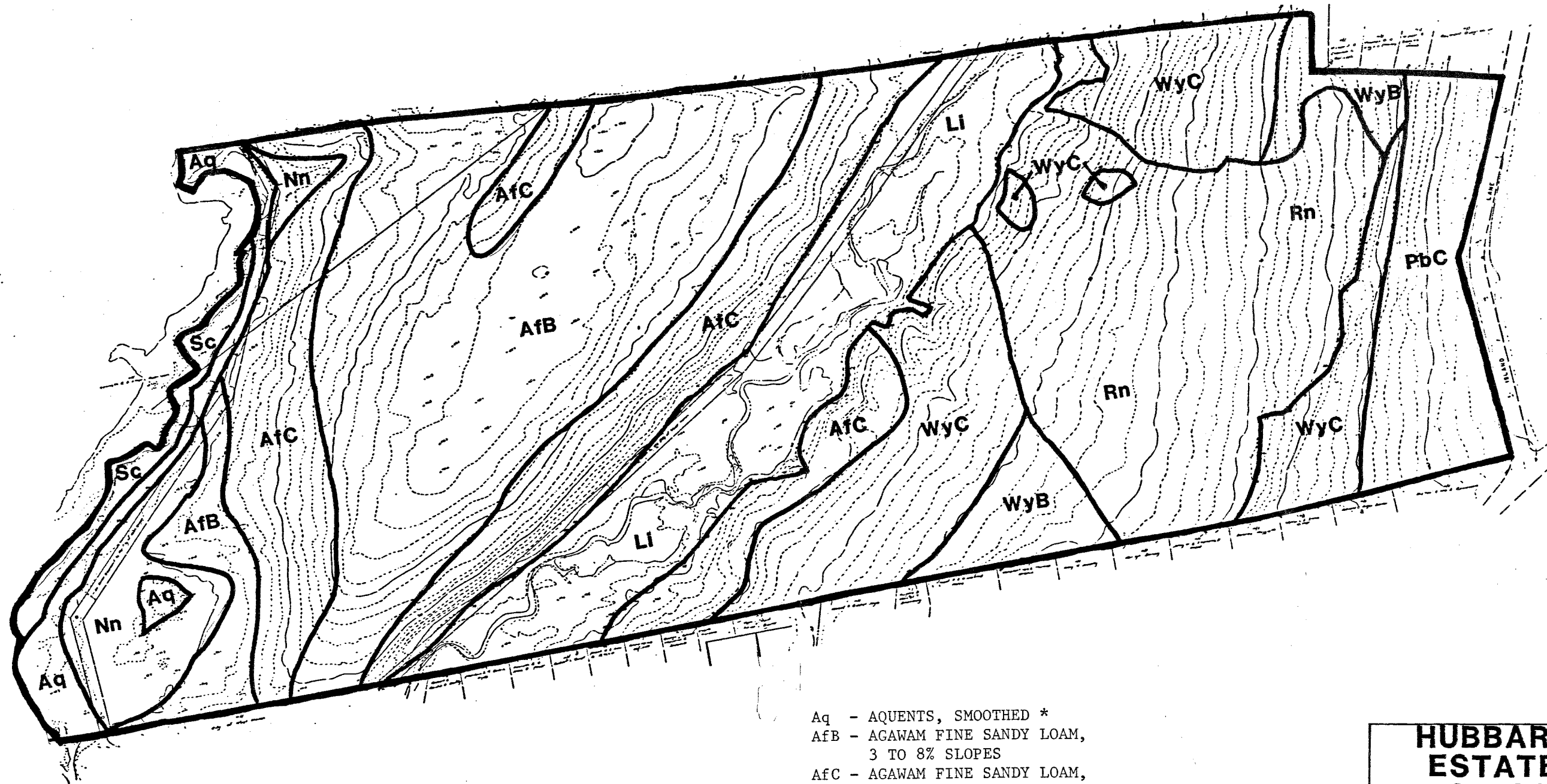
- 1) Currently, surface and subsurface water (from the site) enters the east branch of the Oyster River floodplain over a broad area and from a number of watercourses. Development of the till sideslope and changes in how surface and subsurface water will reach the floodplain wetlands may impact the seasonal moisture regime of the corridor.
- 2) Although there is some natural erosion on the site and some man induced erosion (by increased runoff, bike trails, sewer lines), to state that "erosion opportunities on this hillside will be substantially reduced by the construction of this subdivision" is misleading. With the amount of cuts, fills, and disturbed area proposed, there is the potential for significant erosion and sedimentation damage on and off site.
- 3) Although there are areas of the "sidehill" wetland with slopes greater than 8%, slope is dominantly 3-8%. There is some ponding of surface water and stormwater storage associated with this wetland.

SEDIMENT AND EROSION CONTROL

In 1983, Public Act No. 83-388, "An Act Concerning Soil Erosion and Sediment Control", was passed to "reduce the danger from storm water runoff, minimize non-point sediment pollution from land being developed and conserve and protect the land, water, air and other environmental resources of the state." Under this law, most applications for development must have a comprehensive sediment and erosion control plan which includes a map and narrative. While Hubbard Farms Estates West has a sediment and erosion control plan, it lacks certain elements which are needed to minimize erosion and sediment on a construction site. A worksheet useful as a guideline in preparation of a sediment and erosion control plan is included in Appendix B.

The following are concerns and recommendations regarding the sediment and erosion control plan as presented on sheets 5, 6 and 15 of plans for Hubbard Farms Estates West, dated April 1, 1987, latest revision October 23, 1987:

Figure 7



- Aq - AQUESTS, SMOOTHED *
- AfB - AGAWAM FINE SANDY LOAM,
3 TO 8% SLOPES
- AfC - AGAWAM FINE SANDY LOAM,
8 TO 15% SLOPES
- Li - LIM SILT LOAM *
- Nn - NINIGRET FINE SANDY LOAM
- PdC - PAXTON VERY STONY FINE SANDY
LOAM, 8 TO 15% SLOPES
- RN - RIDGEBURY, LEICESTER AND WHITMAN
EXTREMELY STONY FINE SANDY LOAMS *
- Sc - SACO SILT LOAM *
- WyB - WOODBRIDGE VERY STONY FINE SANDY
LOAM, 3 TO 8% SLOPES
- Wyc - WOODBRIDGE VERY STONY FINE SANDY
LOAM, 8 TO 15% SLOPES

* WETLAND SOILS

**HUBBARD FARMS
ESTATES WEST
SUBDIVISION**

WEST HAVEN, CONNECTICUT

SOILS

King's Mark Environmental Review Team

0 200

1. Extensive cutting and filling is proposed for road construction and lot development. Consequently, large areas of the site would be cleared of vegetation and soils disturbed. Such action, combined with the sloping land and wet soils on the site, would result in a most serious erosion and sediment problem. In light of this, the developer should consider the following principles:
 - a. Minimize the area where vegetation is disturbed and land graded. Plan the development to fit the site as much as possible and stage the development so that only limited areas are disturbed at any given time during construction.
 - b. Stay out of wetlands as much as possible. Wetlands are natural resources and affect the other environmental resources which P.A. 83-388 was passed to protect. Avoid working wet soils especially during times of the year when precipitation and water table levels are high. This can break down soil structure and increase soil erodibility.
 - c. Maintain buffer strips of existing vegetation between disturbed areas and wetlands. On plans submitted, steep slopes along the Oyster River and its tributary are shown as graded areas. Consequently, vegetation would be removed and soils disturbed immediately adjacent to areas which are classified as important wetlands in the Biological Evaluation submitted with the plans.
 - d. Plan for surface drainage. There are currently several watercourses draining the hillsides along the Oyster River and its tributary stream. The plans show that almost all of these would be eliminated. This action would destroy the natural wetland drainage network. In addition, it would increase the risk of erosion from surface flows which could concentrate and reestablish a new drainage pattern in less stable cut and fill materials.
2. The detention basin encroaching on the tributary stream wetland should be moved uphill out of the floodplain as the wetland has water detention capabilities. Stable outlets should be extended accordingly.
3. Specifications for vegetative stabilization of the site should be provided directly on the plans. Temporary erosion control measures should be implemented when time of year or weather prohibit establishment of permanent vegetative cover.
4. Sediment barriers are designed for drainage areas of one acre or less. They will not function properly when extended across large drainageways such as the tributary stream. Other methods such as careful staging of culvert placement could be considered for minimizing sedimentation of the stream.
5. A typical detail and narrative should be provided for sediment and erosion control during individual lot development. Lots located directly along the Oyster River and its tributary and in wetland areas are of concern.

6. Riprap should be properly sized and bedded and details provided for all storm drainage outlets.
7. There could be immediate and perhaps long term erosion problems associated with the outlet to the Perry Merrill Drive culvert as the stream reestablishes a channel in this area and flow characteristics are changed.
8. An operations and maintenance program should be included in the plans for all proposed sediment and erosion control measures. Responsibility for long term maintenance of the detention ponds should be assigned.

In the future, the City might consider having a percent buildable area requirement for lots to assure suitable room for usable outdoor living space. When most of a lot is wetland, gradual filling by a homeowner often occurs in order to expand lawn and garden areas. Such action can be subtle and difficult to regulate. It can result in significant destruction of wetlands over a period of time. Such activity on the part of a landowner often creates drainage problems on neighboring properties.

WETLAND CONSIDERATIONS

Morgan Development proposes to subdivide a 48 acre parcel of land in the City of West Haven adjacent to the Oyster River for residential development. In so doing, approximately 9.7 of the 13.4 acres of wetlands on the site will be eliminated for the purpose of constructing houses and roadways, with an additional 1.6 acres committed to the creation of storm water detention basins. The State of Connecticut Inland Wetlands and Watercourses Act of the Connecticut General Statutes addresses this type of wetland manipulation, although regulatory authority rests with the City of West Haven. The current proposal locates over 40 single family house lots within the wetland

boundaries. The largest portion of the affected wetland lies to the southeast of the East Branch of the Oyster River. The forested wetland of concern has an area of approximately 6.9 acres with 3-8% grade.

Wetland Description

The U.S. Fish and Wildlife Service's National Wetland Inventory identifies two wetland types within the study area. This classification is based on the wetlands' hydrologic location, vegetative cover, water regime and site specific modifiers. The wetlands under review are outlined below:

1. PF01E - Palustrine, forested (broad-leaved deciduous), seasonally saturated.
Site wetlands: Hillside and East Branch of the Oyster River.
2. R20WH - Riverine, lower perennial, open water, permanent.
Site wetland: Oyster River.

Wetlands classified as PF01E are characteristically vegetated by a hardwood forest canopy usually dominated by Red Maple (Acer rubrum) with saturated soil or standing water during most of the growing season. The PF01E designation can be further separated into three community types of which two are found on the site.

1. The Red Maple/Ericaceous shrub forest describes the East Branch of the Oyster River. This community is characterized by a shrub layer of species such as Highbush Blueberry (Vaccinium corymbosum), Winterberry (Ilex verticillata), Arrow-wood (Viburnum sp.), and Spicebush (Lindera benzoin). The microtopography is hummocky with numerous herbs in close association. This community is found on both organic and wet mineral soils.
2. The Red Maple/Spicebush forest describes the hillside wetland. The dominant shrub layer is Spicebush (Lindera benzoin). Other trees commonly associated with this type of wetland are Pin Oak (Quercus palustris), Swamp White Oak (Quercus bicolor), and American Elm (Ulmus americana). These species normally inhabit stream banks and swamps in receipt of telluric (nutrient laden) water from adjacent uplands.

Comments

The vegetation and leaf litter present on this hillside wetland provide soil stabilization and considerable surface area for nutrient cycling, organic production and pollution abatement, thereby improving water quality of runoff

from Island Lane and adjacent uplands prior to entry into the Oyster River. This function will essentially be lost when sheet flow is replaced by channelized storm drainage.

Although this hillside wetland provides limited storage capacity for surface water, significant volumes of water are retained within the wetland soils. This volume of water is released slowly via seepage into the East Branch floodplain along the entire length of the hillside wetland, maintaining the floodplain wetland's long-term productivity, wetland character and water quality enhancement contributions to the Oyster River. This maintenance function via seepage from the perched water table will be lost as it is collected and replaced by single point discharges from detention basins. As this wetland is maintained by a seasonally saturated water table, the construction of a large number of homes and access roadways entirely within these wetlands would require major hydrological alteration and drainage. This activity would result in irretrievable and irreplaceable loss of wetland resources in a developed area in which wetlands of any type are a limited and valuable resource.

Additionally, but not least of which, the floodplain wetland of the East Branch of the Oyster River is the broadest, most diverse and desirable wetland on this site. Efforts to maintain the wetland character should continue to be one of the priorities of this permit evaluation.

The City of West Haven requires a 25 foot buffer zone around wetlands from any type of disturbance. The proposed development indicates no provision for such buffer zones. In fact, some filling and alteration of the wetland along the East Branch of the Oyster River will be necessary to install the detention basin, as the proposal indicates. Buffer zones are an integral part of wetland preservation. Such areas provide feeding and breeding habitat for many forms

of wildlife, add to the diversity of flora and aid in sediment and erosion control. In addition, they remove nutrients, sequester pollutants from surficial runoff and remain as aesthetically pleasing open space.

As canopy and understory wetland vegetation is replaced by manicured lawns and impervious surfaces, pollutants generated by fertilizer and pesticide use, winter road maintenance and vehicles will contribute to the load already existing in the East Branch of the Oyster River. Such undesirable effects are clearly contrary to the State's goals of maintenance and restoration of surface water quality as stated in the Water Quality Standards and Criteria, Section 22a-426 of the Connecticut General Statutes.

Alternatives

There are sufficient uplands on site to provide desirable alternatives with greatly reduced impacts upon existing wetlands while still providing economic feasibility. This proposal might be redesigned to reduce the permanent loss of wetland resources and incorporate appropriate conservation measures.

Alternatives such as multi-family housing, cluster housing or a reduced number of lots aligned to maximize use of available uplands and specifically designed to minimize wetland impacts would result in a desirable and appropriate land use correlated with State resource protection statutes.

Conclusion

This subdivision proposal, if approved, will result in the permanent loss of 9.7 acres of wetland resources, with possible secondary effects upon water quality within the East Branch of the Oyster River. Therefore, it is inconsistent with the State of Connecticut's policies regarding the protection of natural resources as provided for in the Inland Wetlands and Watercourses Act, Sections 22a-36 through 22a-45 of the Connecticut General Statutes.

WATER QUALITY CONSIDERATIONS

The Department of Environmental Protection has assigned a water quality classification of B/A (SB/SA for the tidal segment) to the Oyster River. This means that the existing water quality is classified B, or suitable for recreational use, fish and wildlife habitat, and is of good to excellent aesthetic value. The B classification was assigned because the Oyster River flows through areas of urban or industrial development, and is associated with a watershed whose groundwater is classified GB. It is not because of the existence of any wastewater discharges or leachate sources as there are none known to exist. Consequently, it is the DEP's intention to eventually conduct a water quality survey of the river in order to determine the appropriateness of the B/A classification.

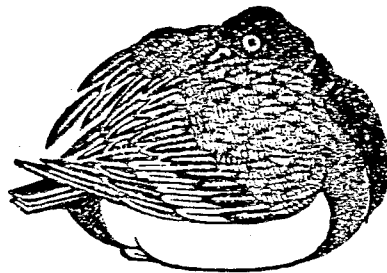
Presently, the goal remains to upgrade the water quality classification of the Oyster River to an A classification, meaning it would have potential for use as a drinking water supply. The discharge of stormwater to a class A stream is consistent with Connecticut Water Quality Standards subject to several conditions. These are (1) that the "Best Management Practices" are utilized as necessary to minimize floating solids, oils and grease; (2) that no silt or sand is deposited other than of natural occurrence, except as may result from normal activities provided all reasonable controls are used; and (3) that no turbidity increase occurs greater than 10 JTU over ambient levels.

The DEP does not presently have any official guidelines in place as to what constitutes "Best Management Practices" for stormwater treatment, but is waiting for EPA to promulgate its stormwater permit regulations. The general consensus, based on the results of toxicity testing performed by the EPA, is that untreated urban runoff does not cause sufficient toxicity to aquatic

organisms. In order to satisfy the water quality standards, treatment is generally required for removal of sand, grit and floatable materials.

Concerning the proposed project, sufficient information has not been provided to review the adequacy of the proposed stormwater treatment. Detention/sedimentation basins, however, are considered to provide acceptable treatment, if properly sized and maintained. Proper treatment should minimize the impacts from the proposed additional stormwater flows on the water quality of the Oyster River.

BIOLOGICAL RESOURCES



Other factors to consider in determining open space set aside are possible future uses of the land (recreation, preservation, active management), the need to conserve a particular type of habitat within the town/region, and uses/needs of the surrounding area. Whatever type or combination of types of areas set aside, setting aside an "island of open space" surrounded by development should be avoided if at all possible. The area should have natural travel pathways for wildlife (such as streams, valleys, ridgetops) to enter and exit to other open space areas outside the development. The open space area is more valuable to wildlife if not traversed by roads, which may impede the movements of wildlife at times.

Wildlife Resources/Recommendations

As with any development, the impact on wildlife habitat in general will be negative. A sizable area will be broken up and lost with the construction of roads, driveways, walkways, parking areas and homes. Another impact is the loss of habitat where cover is cleared for lawns and landscaping. A third impact is the increased human presence, vehicular traffic, and a number of free roaming dogs and cats. This could drive the less tolerant species from the site, even in areas where there has been no physical change. The design of this development which contains many small lots will probably augment the negative impact to wildlife habitat.

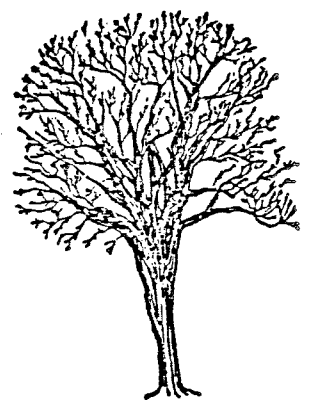
In a small but heavily developed and populated state like Connecticut, where available habitat continues to decline on a daily basis, it is critical to maintain and enhance, where possible, existing wildlife habitat. In planning and constructing a development, there are steps that could be considered in order to help minimize adverse impacts on wildlife:

1. Maintain a 100 foot (minimum) wide buffer zone of natural vegetation around all wetland/riparian areas to filter and trap silt and sediments and to provide some habitat for wildlife.

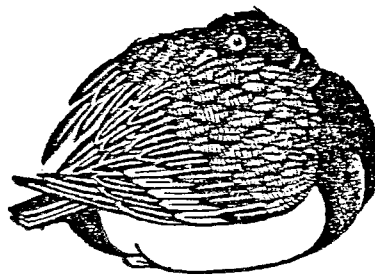
2. Utilize natural landscaping techniques (avoiding lawns and chemical runoff) to lessen acreage of habitat lost and possible wetland contamination.
3. Stone walls, shrubs and trees should be maintained along field borders.
4. Early successional stage vegetation (i.e. field) is a habitat type and should be maintained if possible.
5. During land clearing, care should be taken to maintain certain forest wildlife requirements:
 - a. Encourage mast (nut) producing trees (i.e. oak, hickory, beech). A minimum of 5 oaks, 14 inches in diameter or greater should remain.
 - b. Leave 5 to 7 snag/den trees per acre as they are used by birds and mammals for nesting, roosting and feeding.
 - c. Exceptionally tall trees, used by raptors as perching and nesting sites, should be encouraged.
 - d. Trees with vines (i.e. fruit producers) should be encouraged.
 - e. Brush debris from tree clearing should be piled to provide cover for small mammals, birds and amphibians and reptiles.
 - f. Shrubs and trees which produce fruit should be encouraged (or can be planted as part of the landscaping in conjunction with the development) especially those that produce fruit which persists through the winter (winterberry, autumn olive). See Appendix C for a list of suggested shrub and tree species that can be encouraged and/or planted to benefit wildlife.
 - g. Nesting sites can be provided for a great variety of birds with placement of artificial nest boxes.

Large house lots or cluster housing leaving large open space areas, and implementation of the suggested guidelines will help to minimize the adverse impacts of local wildlife population. Implementation of backyard wildlife habitat management practices should be encouraged. Such activities include providing food, water, cover and nesting areas.

**LAND USE AND PLANNING
CONSIDERATIONS**



APPENDICES



Appendix A: Soils Limitation Chart

MAJOR LIMITATIONS TO THE DEVELOPMENT OF:

DRAINAGE CLASS AND
DEPTH TO SEASONAL
HIGH WATER TABLE

GENERAL SOIL
PROPERTIES

MAP UNIT
NAME

HOMES WITH
BASEMENTS

ROADS AND
STREETS

Wetness,
subject to
frost action

Wetness

Soils disturbed by
cutting and filling
in loamy to sandy
materials.

Aq - Aquent,
smoothed

None

None

Well drained
4 ft.

Glacial outwash
soils formed in
loamy over sandy
materials.

AfB - Agawam
fine sandy loam,
3 to 8% slopes

None

None

Well drained
4 ft.

Glacial outwash
soils formed in
loamy over sandy
materials.

AfC - Agawam
fine sandy loam,
8 to 15% slopes

Frequent
flooding,
wetness,
subject to
frost action

Frequent
flooding,
wetness

Poorly drained
0 - 1.5 ft.

Alluvial soils
formed in loamy
materials.

Li - Lim silt
loam

Subject to
frost action

Wetness

Moderately well drained
1.5 - 2.5 ft.

Glacial outwash
soils formed in
loamy over sandy
materials.

Nn - Ninigret
fine sandy loam

None

Seasonal
wetness

Well drained
1.5 - 2.5 ft.

Glacial till soils
formed in dense
loamy materials.

PdC - Paxton very
stony fine sandy
loam, 8 to 15%
slopes

Wetness,
subject to
frost action

Wetness

Poorly to very poorly
drained
0 - 1.5 ft.

Glacial till soils
formed in dense
loamy materials.

RN - Ridgebury,
Leicester and
Whitman extremely
stony fine sandy
loams

MAJOR LIMITATIONS TO THE DEVELOPMENT OF:

MAP UNIT NAME	GENERAL SOIL PROPERTIES	DRAINAGE CLASS AND DEPTH TO SEASONAL HIGH WATER TABLE	HOMES WITH BASEMENTS	ROADS AND STREETS
Sc - Saco silt loam	Alluvial soils formed in loamy materials.	Very poorly drained 0 - 0.5 ft.	Frequent flooding, wetness	Frequent flooding, wetness, subject to frost action
WyB - Woodbridge very stony fine sandy loam, 3 to 8% slopes	Glacial till soils formed in dense loamy materials.	Moderately well drained 1.5 - 2.5 ft.	Wetness	Subject to frost action
WyC - Woodbridge very stony fine sandy loam, 8 to 15% slopes	Glacial till soils formed in dense loamy materials.	Moderately well drained 1.5 - 2.5 ft.	Wetness	Subject to frost action

Appendix B: Erosion and Sediment Control Plan Worksheet

NEW HAVEN COUNTY SOIL AND WATER CONSERVATION DISTRICT
EROSION AND SEDIMENT CONTROL PLAN WORKSHEET

This is a guide for the development and review of erosion and sediment control plans. Local commissions should be consulted for regulatory requirements concerning erosion and sediment planning.

Checked () items are those that have been provided on the current erosion and sediment control plan. Items identified with a star (*) should be incorporated into final plans.

Name of development _____
Materials received _____

Total Area _____ Location _____
Engineer _____
Date Received _____ Site Visit _____ Reviewed by _____
Submitted by _____

NARRATIVE SECTION DESCRIBING:

- _____ The development
- _____ Major land uses of adjoining areas
- _____ The number of total acres and acres to be disturbed in the project
- _____ The schedule of grading and construction activities including:
 - Start and completion dates.
- _____ Application sequence of all E & S control measures
- _____ The design criteria for all proposed E&S control measures
- _____ Construction details and installation procedures for all proposed E&S control measures
- _____ The operations and maintenance program for all proposed E&S control measures
- _____ The name of the person or organization that will be responsible for the installation and maintenance of the E&S control measures
- _____ Organization or person responsible for maintenance of permanent measures when project is completed. Measures include: _____

=====

A SITE PLAN AT A SUFFICIENT SCALE SHOWING:

Natural Features

- _____ Existing topography
- _____ Existing vegetation
- _____ Soils information, including test pit data if available
- _____ Identification of wetlands, watercourses, major drainageways and water bodies on the site
- _____ Name of soil scientist who performed wetlands delineations and flag numbers
- _____ Rock outcrop areas
- _____ Seeps, springs
- _____ Major aquifers
- _____ Floodplains (100 yr.) and floodways
- _____ Channel encroachment line (DEP permit required)
- _____ Coastal zone boundary
- _____ Public water supply watershed boundaries
- _____ Possible Army Corps Sec. 404 or Sec. 10 Permit Areas
(Contact Corps @ 1-800-343-4789).

Project Features

_____ The location of the proposed development
_____ A plan legend
_____ Adjacent properties
_____ Property lines
_____ Lot lines and setback lines
_____ Lot and/or building numbers
_____ Planned and existing roads
_____ Proposed structures
_____ Location of existing and planned utilities
_____ Location of wells and septic systems
_____ Proposed topography
_____ North arrow

Clearing, Grading, Vegetative Stabilization

_____ The sequence of grading, construction, and sediment and erosion control activities
_____ The location of and construction details for all proposed E&S control measures
_____ Recommended measures include _____

_____ Limits of disturbed areas
_____ Extent of areas to be graded
_____ Disposal procedure for cleared material
_____ Location of stockpiled topsoil and subsoil
_____ Temporary erosion protection for stockpiles
_____ Areas to be vegetatively stabilized
_____ Temporary erosion control in disturbed areas
_____ Method for protection of disturbed areas when time of year or weather prohibit establishment of permanent vegetative cover
_____ Seedbed preparation (including topsoiling specifications)
_____ Seeding mixture, rates, and seeding dates
_____ Fertilizer and lime application rates
_____ Mulch application rate
_____ Mulch anchoring measures

Drainage System

_____ Existing and planned drainage pattern
_____ Drainage areas used in design of stormwater management system
_____ Size and location of culverts and storm sewers
_____ Drainage calculations for review by town engineer
_____ Stormwater management measures and construction details
_____ Groundwater control measures (footing drains, curtain drains)
_____ Planned water diversions and dams (DEP permit may be required)

House Site Development

_____ Sediment and erosion control measures for individual lot development

Additional Comments

Appendix C: Suitable Planting Materials For Wildlife
Food and Cover

SUITABLE PLANTING MATERIALS FOR WILDLIFE FOOD AND COVER

HERBACEOUS/VINES

SHRUBS

SMALL TREES

Panicgrass

Sumac

Hawthorn

Timothy

Dogwood

Cherry

Trumpet creeper

Elderberry

Serviceberry

Grape

Winterberry

Cedar

Birdsfoot trefoil

Autumn olive

Crabapple

Virginia creeper

Blackberry

Switchgrass

Raspberry

Lespedeza

Honeysuckle

Bittersweet

Cranberrybush

Boston ivy

NOTES

ABOUT THE TEAM

The King's Mark Environmental Review Team (ERT) is a group of environmental professionals drawn together from a variety of federal, state, and regional agencies. Specialists on the Team include geologists, biologists, soil scientists, foresters, climatologists, landscape architects, recreational specialists, engineers, and planners. The ERT operates with state funding under the aegis of the King's Mark Resource Conservation and Development (RC & D) Area - a 83 town area serving western Connecticut.

As a public service activity, the Team is available to serve towns and/or developers within the King's Mark RC & D Area - free of charge.

PURPOSE OF THE ENVIRONMENTAL REVIEW TEAM

The Environmental Review Team is available to assist towns and/or developers in the review of sites proposed for major land use activities. For example, the ERT has been involved in the review of a wide range of significant land use activities including subdivisions, sanitary landfills, commercial and industrial developments, and recreational/open space projects.

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 site, and highlighting opportunities and limitations for the proposed land use.

REQUESTING AN ENVIRONMENTAL REVIEW

Environmental Reviews may be requested by the chief elected official of a municipality, or the chairman of an administrative agency such as planning and zoning, conservation, or inland wetlands. Environmental Review Request Forms are available at your local Soil and Water Conservation District, and the King's Mark ERT Coordinator. This request form must include a summary of the proposed project, a location map of the project site, written permission from the landowner/developer allowing the Team to enter the property for purposes of review, and a statement identifying the specific areas of concern the Team should investigate. When this request is approved by the local Soil and Water Conservation District and King's Mark RC & D Executive Committee, the Team will undertake the review. At present, the ERT can undertake two (2) reviews per month.

For additional information regarding the Environmental Review Team, please contact your local Soil and Water Conservation District or Nancy Ferlow, ERT Coordinator, King's Mark Environmental Review Team, King's Mark Resource Conservation and Development Area, 322 North Main Street, Wallingford, Connecticut 06492. King's Mark ERT phone number is 265-6695.