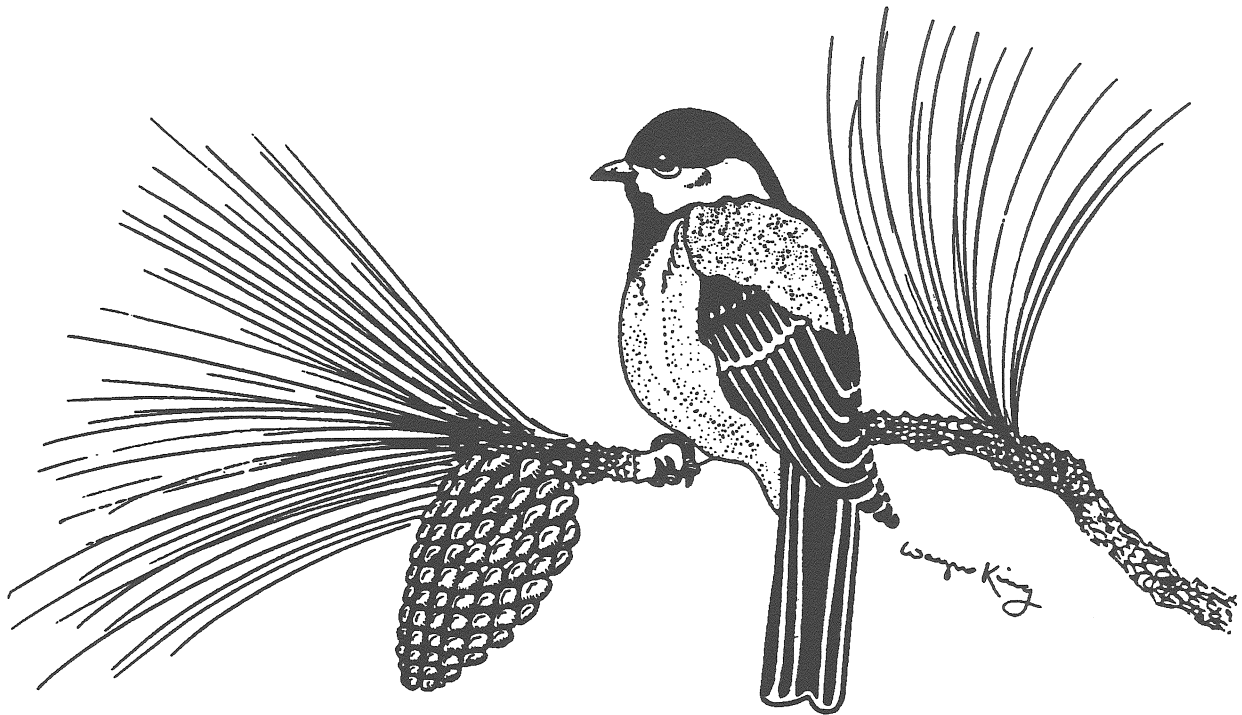


KING'S MARK ENVIRONMENTAL REVIEW TEAM



REPORT FOR

PINE HILL ESTATES SUBDIVISION

NORTH HAVEN,
CONNECTICUT

King's Mark Resource Conservation and Development Area, Inc.

PINE HILL ESTATES SUBDIVISION

NORTH 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

North Haven Inland Wetlands 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 Inland Wetlands Commission and the Town. 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.

JUNE 1991

ACKNOWLEDGMENTS

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Finally, special thanks to Nancy Wilson, North Haven Land Use Administrator, David Lord of Soil Resource Consultants, Jonathan Bodwell of Anderson Associates, Paul Rebesch Jr., Donald Ballou and the Wallingford Land Trust for their cooperation and assistance during this environmental review.

EXECUTIVE SUMMARY

Introduction

An environmental review was requested by the North Haven Inland Wetlands Commission for Pine Hill Estates Subdivision, located in the southeast corner of North Haven. The 119-acre site contains mostly open areas of grass pasture and hay fields mixed with coniferous and deciduous trees and approximately 26 acres of wetlands and swamp. The south and eastern borders of the site contain steep slopes.

The site is bounded by wooded, undeveloped land, Beach Lane and residential properties, including similar developments. The developer proposes building 88 houses with a minimum lot size of 25,000 square feet in accordance with the Reduced lot requirements for land zoned R-40. The development will be served by public water and sewer lines. There are 7 wetland activities proposed, including 4 road crossings, 2 detention basins and construction of the sewer line. Also, 36 acres will not be developed and will be set aside as open space. Historically, the area has been used for agriculture and low density residences. There has been a slow decrease in farmland and an increase in residences over time.

The purpose of this review is to inventory and assess existing natural resources, particularly wetland and water resources, and discuss the impacts of development. This environmental information will be used to assist the Town in guiding conservation and development in this area.

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

Topography

The topography of the area is characterized by gentle to moderate slopes, several knolls, a large flat lowland and local areas of steep slopes. Bedrock is close to the surface in several broad areas on the site.

Wetland Hydrology

The wetlands over the higher land are relatively narrow water drainage channels and are probably ephemeral. Water in the streams was clear and apparently of high quality. The wetlands are generally small in size and do not appear to be major water-storage areas. An exception is the large lowland wetland south of Beach Lane. Even if some siltation does occur, it will not seriously alter the function of the wetlands. The creation of an artificial wetland at Detention Basin # 2 is unnecessary and possibly a liability.

Aquifers

No important aquifers were noted at the site. The bedrock is undoubtedly fractured, and the sandstone may be porous. However, neither are of great significance, and the proposed subdivision should have little impact on them.

Surficial Geology

The major surficial geologic deposit that occurs on the site, a northward draining hillside, is glacial till of variable thickness. The only significant exception is the wet area immediately south of Beach Lane, which is flat and underlain by lake sediments. Talus-like rocky debris is found along the southeastern border on the steep slopes. Groundwater is close to the surface at many locations which suggests that bedrock is close to the surface or that compact basal till underlies the more sandier surficial soils. This is not a concern because of planned municipal water and sewer systems.

Bedrock Geology

Bedrock underlying the site consists of rocks of Mesozoic age. Most of the area is underlain by arkosic sandstone and conglomerate referred to as New Haven Arkose. Outcrops of Talcott Basalt overlie the New Haven Arkose in the southern portion of the site. A prominent knob, labeled the Buttress Dolerite, is composed of arkose on the upper portion and basalt on the lower portion and is found in the northwest corner of the site.

Geological Observations

The developer has efficiently planned the proposed subdivision to maximize the number of building lots. Territory set aside as open space is merely land that is unusable to the developer. No important geologic resources will be destroyed by the proposed subdivision. Erosion and sedimentation, except for Detention Basin # 2, should not be of concern other than during construction and prior to landscaping.

Hydrology

The majority of the site drains into Five Mile Brook, a tributary of the Muddy River, except for a small portion in the southwest corner of the site which drains into an unnamed tributary of the Farm River. On-site stormwater detention is proposed. The hydrology and hydraulics for the proposed subdivision appear reasonable. DEP dam permits and diversion permits will be needed for the 2 proposed dams. Elimination of Detention Basin #1 and the enlargement of Detention Basin #2 are recommended. In addition, the outlet pipe of Detention Basin #2 should be extended to Five Mile Brook.

Soil Resources

The major soil limitations are shallow to bedrock soils in the vicinity of Alex Court and nearby portions of Summer Lane and glacial till soils, which can be extremely difficult to stabilize when extensive cuts and fills are required. These limitations do not preclude development, but indicate the need for precise planning. The Town should test the dairy herd burial site to assure future subsidence will not occur in this location. The E&S control plan lacks certain elements needed to minimize erosion and sedimentation. Suggestions include formulating deed restrictions for lots bordering on or containing wetlands to prevent disturbance of wetlands, moving stormwater outlets to stable elevations, incorporating complete E&S controls on the plans, maintaining silt fences until all disturbance is stabilized and properly installing, maintaining and monitoring all E&S controls. Additionally, E&S control measures are needed for the proposed stream location along Lots 86-88, and the site should not be opened up in the winter due to the hardpan soils within the steep slope areas.

Wetland Considerations

Generally, the proposed subdivision application demonstrates a concerted effort to avoid wetland impacts. The crossings and fringe impacts are minor and should not result in a serious degradation of wetland habitat or functions. There are 3 main concerns that must be addressed. First, it is recommended that an alternative stormwater management plan be investigated to alleviate the need for Detention Basin #1 to be in the wetlands. If this detention basin is absolutely necessary, Best Management Practices should be implemented. It is acceptable to create an open water/marsh at the location of Detention Basin #2 provided the basin is maintained. Secondly, the wetlands should be protected from degradation that may be associated with direct discharge of stormwater. Drainage outlets should be located a minimum of 10 feet from the wetland boundary. Finally, to visually enhance the site and to benefit the wildlife population, as many of the existing trees as possible should be allowed to remain.

Wildlife Considerations

Wildlife habitat at the site consists of forest, wetlands, old fields and open hay fields. Because of the variety of habitats on the site and the degree of mixing of these habitat types, the site provides good to excellent wildlife habitat. A variety of wildlife is expected to use this area, including deer, ruffed grouse, weasel, raccoon, beaver, fox, coyote, hawks, owls, songbirds, reptiles and amphibians.

The large open space area of farmland offers a valuable section of wildlife habitat because the site is located in an area where development has been great. Streams are used as travel corridors by many wildlife species. A 100-foot buffer around streams is recommended for protection. Wetlands are also very important to wildlife. A 100 foot buffer of undisturbed vegetation around wetlands is recommended for wildlife and protection of the wetlands from siltation.

Placing detention basins in upland areas is preferred to conserve wetland habitat. Using wetlands for detention basins almost always results in degraded wildlife habitat. The creation of an open water detention basin would increase wetland diversity, but only temporarily. The detention basins will fill in over time if not properly maintained. However, even if the basin is maintained, the removal of silts and sediments and the fluctuating water levels will cause the vegetation and wildlife scheme to change drastically.

Ending Summer Lane at Lot 45 and adding the lots in this area to the open space will eliminate 2 wetland crossings. This would reduce the impacts to Wetland D and Wetland E and preserve a diverse area of habitat contiguous to the stream that runs into Five Mile Brook.

As with any development, the impact on wildlife will be negative and long-lasting. The area will be broken-up and lost to roads, driveways, lawns and houses. Increased numbers of humans, dogs, cats and cars will also affect wildlife. Certain species which adapt well can become a nuisance. Alternative designs which can protect wildlife habitat include large lots and cluster development. Setting aside a combination of habitats for open space is desirable. Open space areas should be large and connected to provide travel paths. Certain steps can be taken to minimize the effects of development on wildlife. These include buffer strips, natural landscaping techniques, maintaining field borders and early successional stage vegetation and maintaining wildlife requirements.

Threatened and Endangered Plant and Animal Species

According to the Natural Diversity Data Base, there are no Threatened or Endangered Species or Connecticut "Species of Special Concern" at the site.

Archaeological Considerations

No archaeological sites are listed in the project area. However, an adjacent property has a significant archaeological site dating to as much as 4,000 years ago. The proposed subdivision site has similar environmental features that suggest a high probability for archaeological resources. The Office of State Archaeology recommends a survey of sensitive portions of the project area to determine if prehistoric Indian sites are present.

Planning Considerations

The predominant land use is currently a mixture of medium and low density neighborhoods, and the general land use has recently gone through a transformation from active agricultural land to medium density residential land use. Although the underlying zone is currently R-40, the applicant will use the reduced lot area provision set forth in Section 4.3 of the North Haven Zoning Regulations. The new Cluster Zoning Regulation, replacing Section 4.3, would allow the preservation of unique land features, but arrives too late to affect site plan design for the proposed subdivision. Maintenance responsibilities for the 2 Detention Basins must be finalized, as well as the ownership of the open space areas. The open space

areas are of adequate size, shape and accessible to all lots within the subdivision. Increased recreational opportunities are needed for the densely populated southeast corner of the site.

The consulting firm of Barakos and Landino conducted a Traffic Impact/Site Access study for the proposed subdivision. The report recommends that a traffic signal be installed at the intersection of Middletown Avenue-Montowese Avenue along with stop signs to control traffic at intersecting roadways. The report concludes that by implementing these minor control improvements, the traffic impact of the proposed subdivision will be negligible. The level of service and safety to Route 17 and Cloudland/Spring Roads must also be considered. The direct impact on the neighborhoods and road networks within East Haven appears negligible. The majority of traffic will probably access Cloudland Road via Beach Road to connect with Montowese Avenue.

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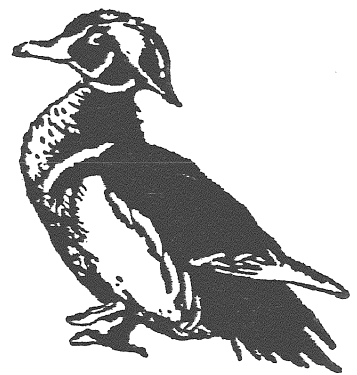
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INTRODUCTION



INTRODUCTION

An environmental review was requested by the Town of North Haven Inland Wetlands Commission for Pine Hill Estates Subdivision, a 119-acre subdivision site located in the southeast portion of North Haven, extending to the East Haven Town Line. Access is provided by North Hill Road and Beach Lane.

The site is an existing farm with many open areas of grass pasture and hay fields. The site contains many stands of deciduous and coniferous trees and approximately 26 acres of wetlands. The proposed subdivision includes 88 lots, each containing a minimum of 25,000 square feet of non-wetland soils, and 36 acres to be left as open space. The subdivision will be served by public water and sewer lines.

The Town is concerned with the impact of the proposed subdivision on the wildlife habitat, wetlands, the existing road networks and surrounding properties. The Town is also concerned about site design compatibility and erosion and sedimentation.

The purpose of this review is to inventory and assess existing natural resources and discuss development opportunities, erosion and sediment (E&S) controls and the maintenance and regulatory activities necessary to assist the Town in guiding conservation and development in this area. Specific objectives include:

- 1) Assessing the hydrological and geological characteristics of the site, including geological development limitations and opportunities;
- 2) Determining the suitability of existing soils to support planned development;
- 3) Discussing soil erosion and sedimentation concerns;
- 4) Assessing the impact of development on the wetlands and watercourses;
- 5) Assessing the impact of development on wildlife; and
- 6) Assessing planning and land use issues.

THE ERT PROCESS

Through the efforts of the North Haven Inland Wetlands Commission, the developer's representatives and the King's Mark ERT, this environmental review and report was prepared for the Town. This report primarily provides a description of on-site natural resources and presents planning and land use guidelines. The review process consisted of 4 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; and
- 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 May 1, 1991. Field review and inspection of the 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 Team members had assimilated an adequate data base, they were able to analyze and interpret their findings. Results of this analysis enabled Team members to arrive at an informed assessment of the site's natural resource opportunities and limitations. Individual Team members then prepared and submitted their reports to the ERT Coordinator for compilation into the final ERT report.

Figure 1

LOCATION OF STUDY SITE

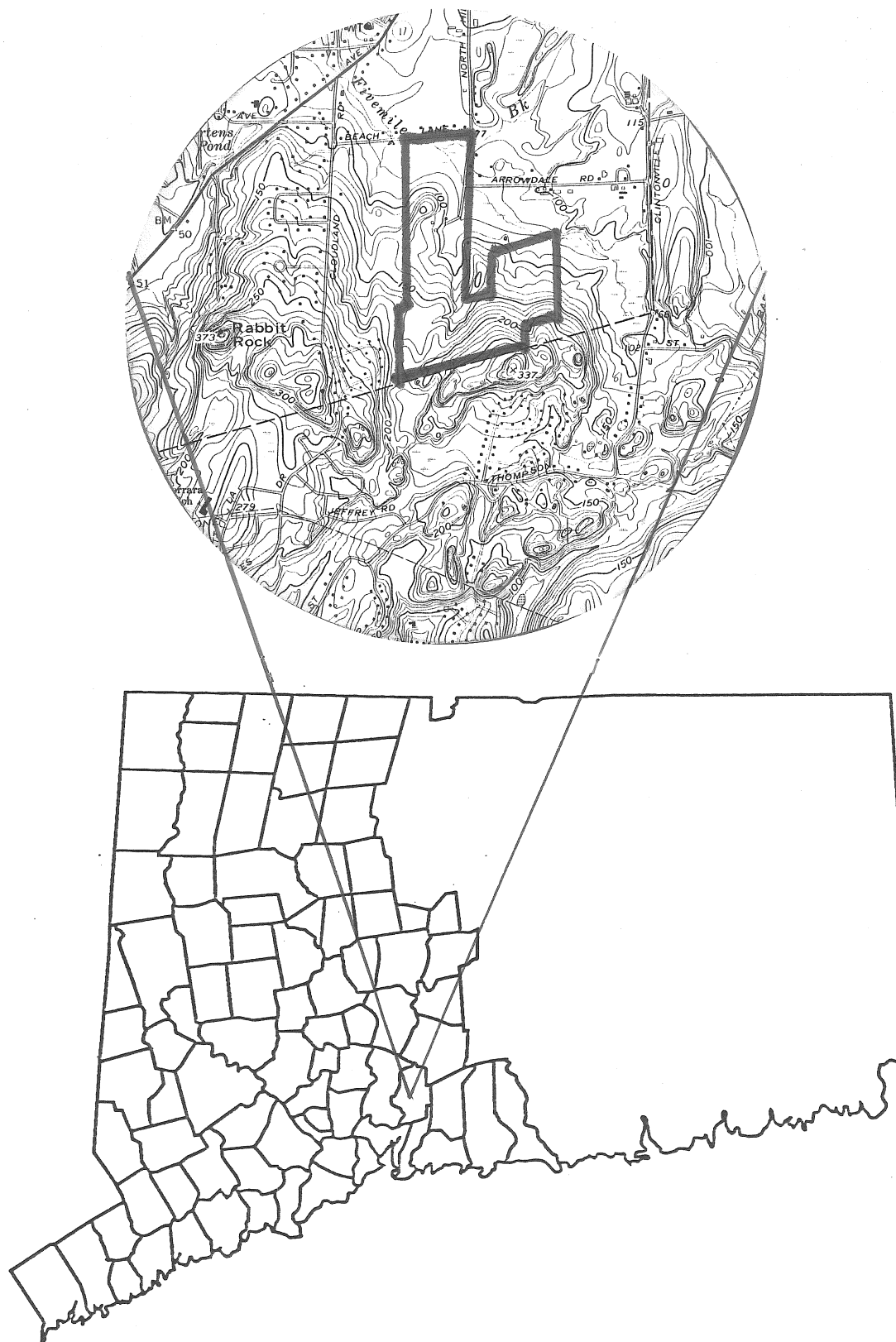
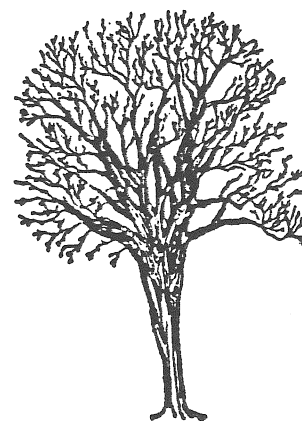


Figure 1 Location of Study Site

Figure 2 Site Plans

PHYSICAL CHARACTERISTICS



TOPOGRAPHY

Topography of the site is characterized by gentle to moderate slopes, several knolls, a large flat lowland just south of Beach Lane and local areas of steep slopes, especially along the south and eastern borders (see Figure 3). Slight bending of lower tree trunks was noticed on the steepest slopes immediately south of the site. However, this was **not** noted on the Pine Hill Estates Subdivision site. Topography should not preclude development as proposed.

WETLAND HYDROLOGY

Wetland areas over the higher land are relatively narrow water drainage channels and are intermittent. The flow of the northward flowing stream that drains the center of the site is seasonal due to variations in the watertable. Flow during the late summer and fall dry spells may be minimal, while significant in the spring. Water in the streams was clear and apparently of high quality. The wetlands are generally small in size and do not appear to be major water-storage areas. An exception is the large lowland wetland south of Beach Lane. Siltation can cause channels to fill and create unstable conditions. Thus, the creation of an artificial wetland at Detention Basin #2 may be unnecessary. Also, the created wetland will be a sedimentation area, eventually filling to its former grade unless some sort of sediment trap is installed and maintained at the inlet to the basin. To the extent that wetlands are created in this manner, so will the cost (probably to the Town) of maintenance be increased.

AQUIFERS

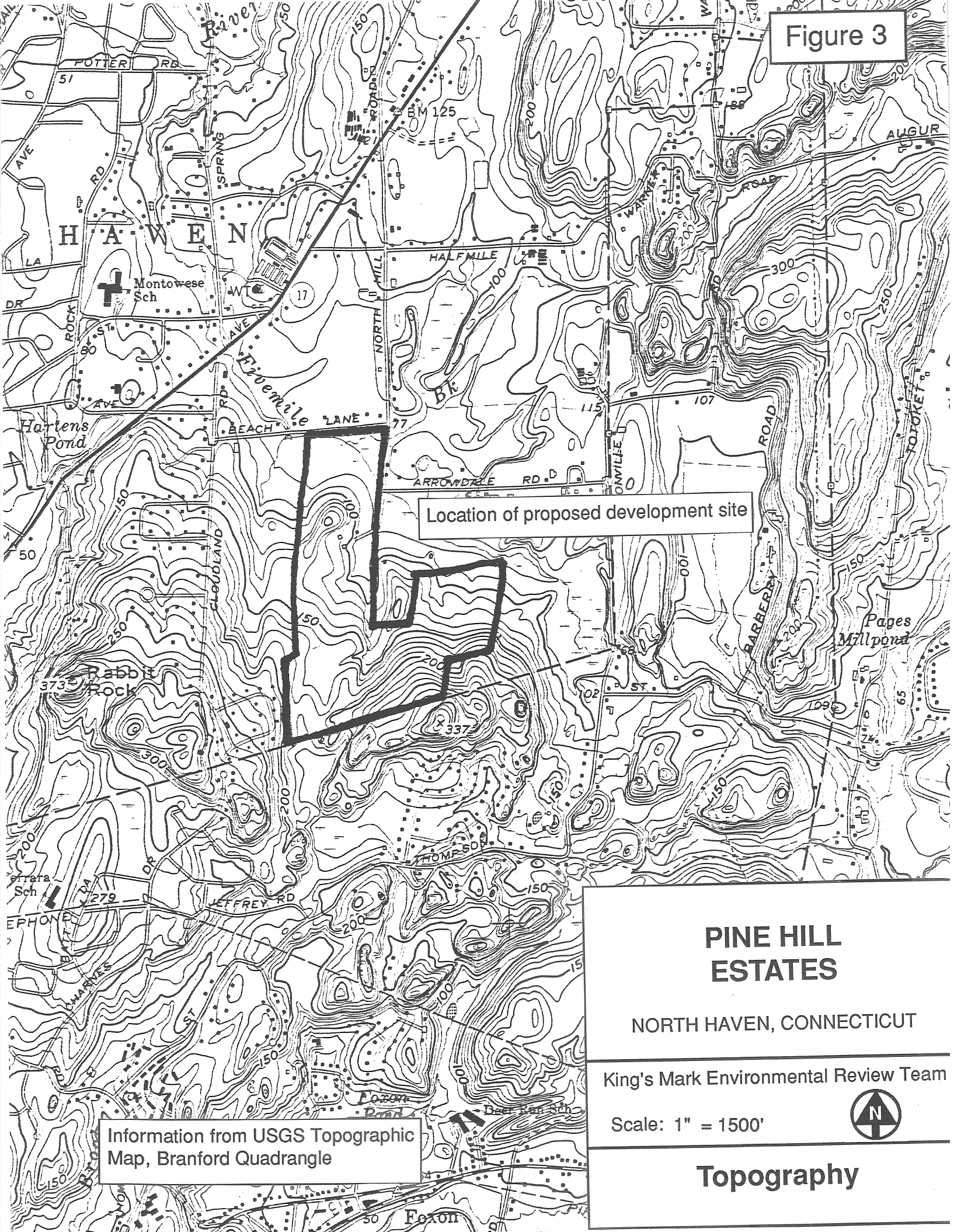
No important aquifers were noted on the site. Bedrock is undoubtedly fractured, and the sandstones may be porous. Both should produce water if drilled into. Neither are notable, and the proposed subdivision should have little impact on them. Surficial sand and gravel aquifers probably lie to the north of the site. Although it is unlikely, these aquifers may extend beneath the northwest corner of the site. Because no development is planned for that area, the sand and gravel aquifers will not have an impact on the proposed subdivision, even if they do extend beneath the site.

SURFICIAL MATERIALS

In general, the site is a northward draining hillside that is covered by glacial till of variable thickness (see Figure 4). A major exception is the wet area immediately south of Beach Lane which is flat and underlain by lake sediments, according to Flint (1964). Local areas on the steep slopes along the southeastern border of the site contain talus-like rocky debris.

Soil drainage over most of the site appears poor, but because of the presence of sandy soils, the site should drain adequately. Groundwater is close to the surface at many locations, which suggests that bedrock is close to the surface or that compact basal till underlies the sandier surficial soils. Other than the wet conditions both produce, neither is of great concern because of planned municipal sewerage and water supply. The nature of the surficial materials should neither preclude nor hinder development as proposed.

Figure 3



Location of proposed development site

PINE HILL ESTATES

NORTH HAVEN, CONNECTICUT

King's Mark Environmental Review Team

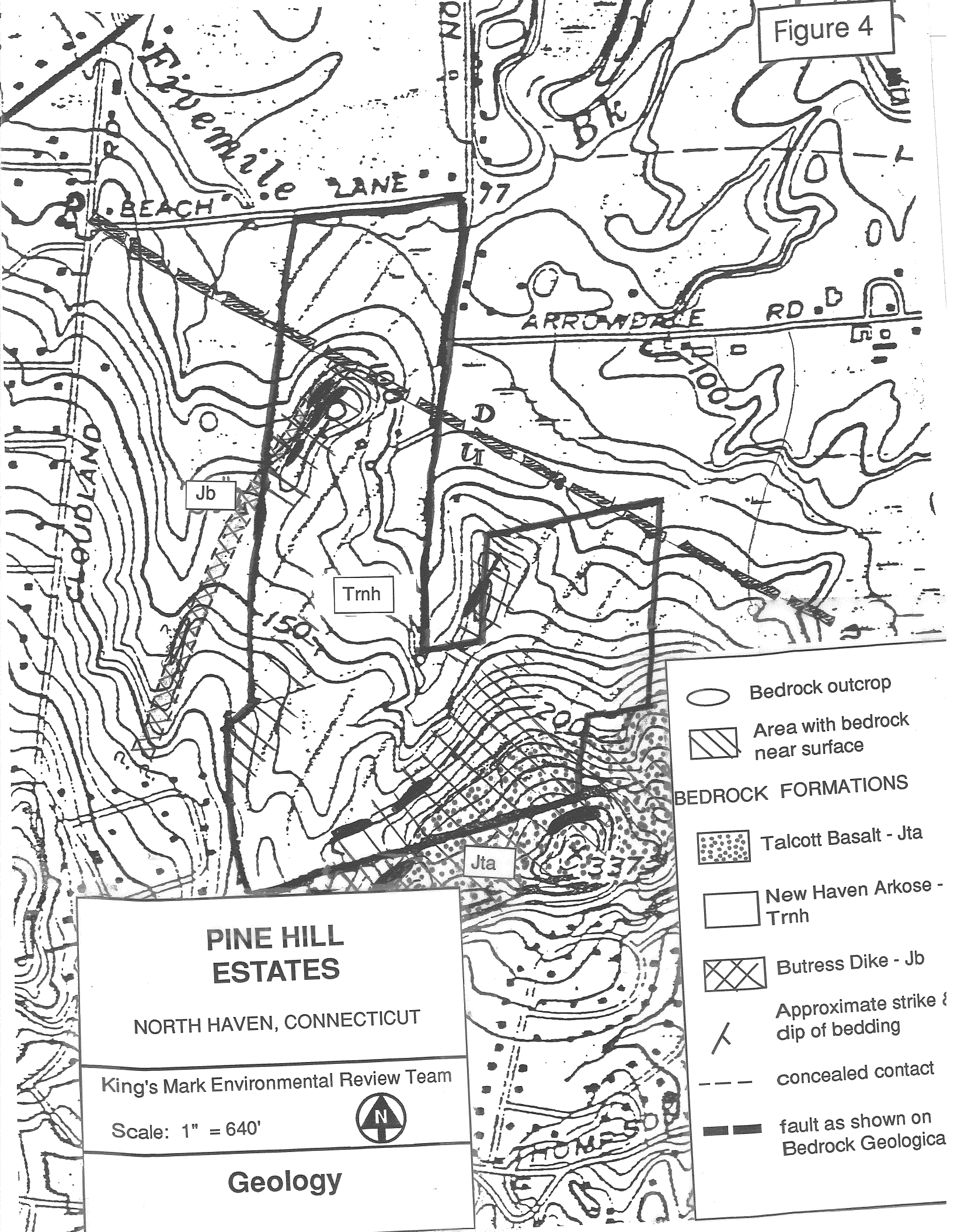
Scale: 1" = 1500'



Information from USGS Topographic Map, Branford Quadrangle

Topography

Figure 4



PINE HILL ESTATES









NORTH HAVEN, CONNECTICUT

King's Mark Environmental Review Team

Scale: 1" = 640'



Geology

-  Bedrock outcrop
-  Area with bedrock near surface
- BEDROCK FORMATIONS**
-  Talcott Basalt - Jta
-  New Haven Arkose - Trnh
-  Butress Dike - Jb
-  Approximate strike & dip of bedding
-  concealed contact
-  fault as shown on Bedrock Geologica

BEDROCK GEOLOGY

Bedrock is close to the surface in several broad areas. Bedrock crops out in 3 areas on the site and extensively immediately to the south and southeast. The area is underlain by rocks of Mesozoic age (i.e., Triassic and Jurassic - approximately 180-200 million years ago). Most of the area is underlain by arkosic sandstone and conglomerate (i.e., red rocks) referred to as the New Haven Arkose. Extensive areas to the south are outcrops of basalt (i.e., trap rock) that are mapped as the Talcott Basalt. The Talcott Basalt overlies the New Haven Arkose. A prominent knob in the northwest portion of the site is composed of arkose on the upper portion and basalt on the lower portion. According to the State map, the basalt intrudes into the arkose and is referred to as the Buttress Dolerite. The outcrops are not unusual and do not warrant protection. Nonetheless, they are of scientific interest and should not be destroyed or covered.

GEOLOGICAL OBSERVATIONS

The site, an existing farm, is a scenic area with pastoral beauty. The developer has efficiently planned the proposed subdivision to maximize the number of building lots. Areas designated as open space are all wetlands with only the amount of bordering non-wetland necessary to make adjacent lot boundaries straight. Territory set aside as open space is merely land that is unusable to the developer.

No important geologic resources will be destroyed by the proposed subdivision. Erosion and sedimentation, except for Drainage Basin #2 as proposed, should not be of concern other than during construction and prior to landscape planting.

HYDROLOGY

Most of the site drains into Five Mile Brook, a tributary of the Muddy River. A small portion in the southwest corner of the site drains into an unnamed tributary of the Farm River. All proposed drainage changes are within the Five Mile Brook Watershed. On-site stormwater detention is proposed.

Development of the site will increase runoff during storm events. These increases will result from soil compaction, removal of vegetation and placement of impervious surfaces over permeable soils. The stormwater plan submitted utilizes the Army Corps of Engineers HEC-1 model and provides pre- and post-development runoff calculations.

The 1985 Federal Emergency Management Agency (FEMA) Flood Insurance Study for the Town of North Haven mentions that frequent residential flooding has been experienced along the upstream portions of Five Mile Brook. Consequently, proper control of stormwater is a concern for this proposed subdivision. Flood boundaries should be included on the plans for the subdivision.

Comments:

- 1) The hydrology and hydraulics for the proposed subdivision appear reasonable. There are significant percentage increases in peak flow ranging from 13% to 67%.
- 2) The dam height for Detention Basin #2 is approximately 6.3 feet. The dam height for Detention Basin #1 is approximately 16 feet. Both dams will require Department of Environmental Protection (DEP) dam permits due to height and downstream hazard. Diversion permits from the DEP are also needed.
- 3) Detention Basin #1 is high enough to create downstream flooding if sudden failure occurs. The impact can be analyzed by doing a breach routing downstream.
- 4) Responsibility for ownership, operation and maintenance of the dams and associated liability should be determined. Town ownership is recommended.

- 5) Elimination of Detention Basin #1 is recommended with consequent decrease in the level of liability and wetland disturbance. The increase in peak flow from Detention Basin #1 (11 cfs) could be directed into Detention Basin #2 via the stormwater system. Do not outlet into the upper wetland as planned. The size of Detention Basin #2 could be increased via excavation to handle increased flows.
- 6) The outlet pipe of Detention Basin #2 should be extended to Five Mile Brook to prevent erosion.

SOIL RESOURCES

Within the landscape of the proposed Pine Hill Estates Subdivision site are level to moderately sloping glacial outwash derived soils in the extreme northern portion of the site within the Five Mile Brook floodplain. In the upland region, which comprises the major portion of the site, there are glacial till derived soils. Very steep slopes occur in the southeastern corner of the site.

The soil map contained in Figure 5 is from the Soil Survey of New Haven County, Connecticut and may be used for general discussion of soil limitations on the site. There was no soil map included with the plans. All discussions of inland wetland locations and boundaries should use the surveyed wetland boundaries mapped by David H. Lord of Soil Resource Consultants. Appendix A contains a chart of important soil features and interpretations.

Shallow to bedrock soils in the vicinity of Alex Court and nearby portions of Summer Lane are of particular concern. The glacial till soils can be extremely difficult to stabilize where extensive cuts and fills are required for roads, driveways and house sites.

The Town should assure that future subsidence will not occur in the vicinity of the dairy herd burial site.

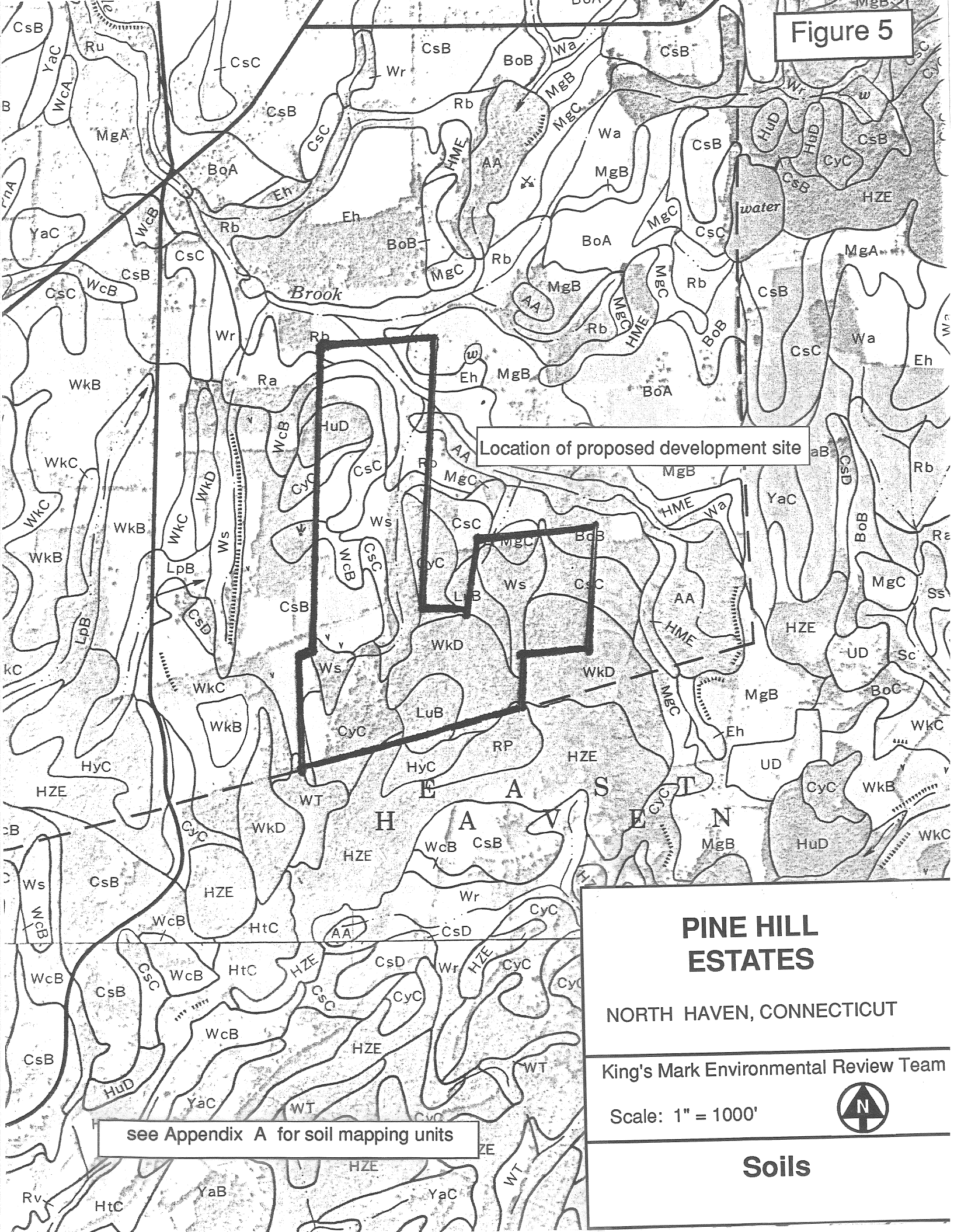
EROSION AND SEDIMENT CONTROL

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 E&S control plan which includes a map and narrative. While Pine Hill Estates Subdivision has an E&S control plan, it lacks certain elements which are needed to minimize erosion and sedimentation on a construction site. A worksheet useful as a guideline in preparation of a E&S control plan is included in Appendix B.


Concerns and recommendations regarding the E&S control plan as presented in the plans submitted for review include the following:

- 1) Deed restrictions should be formulated for lots bordering on or containing wetlands. The restrictions should clearly state that there will be no disturbance of the wetlands for purposes such as dumping yard debris and expansion of usable lawn areas.
- 2) Details on proposed stormwater outlet protection structures are needed. In most instances the outlets are located midslope. The outlets should be carried to a stable elevation to avoid creation of erosion problems below the outlets.
- 3) Maintenance details for proposed sediment barriers should be included in the narrative.
- 4) Construction entrances are mentioned in note II-B, but there is no detail for these structures nor locations for them on the plans.
- 5) Tests pits are recommended for Lots 76-81 to determine the depth to bedrock. This information would be useful in planning grades for the lots.
- 6) An application sequence for all proposed E&S control measures should be included in the plans.

Figure 5



Location of proposed development site

PINE HILL ESTATES
NORTH HAVEN, CONNECTICUT
King's Mark Environmental Review Team
Scale: 1" = 1000'

Soils

see Appendix A for soil mapping units

- 7) If de-watering is needed during construction of detention basins or other structures, pump water should be directed to a properly sized and installed sediment basin prior to discharge into downstream waters.
- 8) An existing vegetation map and a soils map would be useful for evaluation of the site.
- 9) Responsibility should be assigned for maintenance of permanent measures on the site.
- 10) Reed canary grass is not recommended for permanent seedings in or near wetland areas.
- 11) Recommended seeding dates are April 15 to June 15 and August 15 to September 15.
- 12) Details and E&S control measures are needed for the proposed stream relocation along Lots 86-88.
- 13) The 42" pipe outlet to Detention Basin #2 should be extended to the brook, if possible, due to the potential for erosion between the outlet and the stream elevation.
- 14) The stormwater outlet in Open Space "D" should be extended down Summer Lane to Detention Basin #2. This would avoid potential erosion and flooding problems between Lot 41 and Lots 42 and 43.
- 15) A typical E&S control plan for individual lot development is needed, especially for those lots which will require extensive grading for site development.
- 16) The site should not be opened up in the winter months due to the hardpan soils within the steep slope areas. Once disturbed, these soils are extremely difficult to stabilize.
- 17) Additional recommended E&S control elements include:
 - a) A disposal procedure for cleared material;
 - b) Locations and stabilization measures for stockpiled topsoil and subsoil;
 - c) Areas to be vegetatively stabilized;
 - d) Temporary erosion control in disturbed areas;
 - e) Methods for protection of disturbed areas when time of year or weather prohibit establishment of permanent vegetative cover;
 - f) Details on mulch anchoring measures;

- g) Construction guidelines for dam construction; and
- h) Groundwater control measures.

BIOLOGICAL RESOURCES



WETLAND CONSIDERATIONS

A vegetative inventory of the wetlands is contained in a report titled "Environmental Assessment of Proposed Wetland Regulated Activities" prepared by David H. Lord and dated November 5, 1991.

General Site Features

The irregularly-shaped site is located on the East Haven border, south of Beach Lane in North Haven. The site encompasses approximately 119 acres and contains approximately 26 acres of regulated wetlands. Much of the site has been historically altered by agricultural activities. Consequently, a major portion of the site is open grassland that currently remains mowed. The topography ranges from gentle to moderately sloping fields to more steeply sloping areas located in the southeast and northeast portions of the site.

Project Impacts to Regulated Areas

Activity #1, as identified by David Lord in his report, involves the construction of a stormwater detention basin within Wetland C. Wetland C is best described as a forested swamp containing typical vegetative communities associated with forested deciduous swamps. The presence of an easterly flowing watercourse makes the wetland more attractive to wetland-dependent and non-wetland-dependent species. This wetland system collects overland runoff and discharges it downstream into a larger wetland system off-site. While the wetland vegetation may act to filter out upland pollutants from the runoff waters, the actual storage capabilities of Wetland C are limited due to the topography and its position in the watershed. The most valuable function that Wetland C provides is wildlife habitat.

Whenever possible, stormwater detention/retention basins should be constructed outside of wetlands, watercourses or other sensitive riparian areas. The majority of the wetland area on the site has been cleared and exists as grassland. Wetland C is

an attractive forested system in its natural state and, if possible, an alternative location for a detention basin should be investigated. When utilization of wetlands to manage runoff is unavoidable and essential to provide necessary stormwater management, these strategies should be implemented:

- 1) The excavation of wetlands or disturbance of vegetative cover to provide for detention or storage should be avoided or minimized.
- 2) The discharge of stormwaters to wetlands should be accomplished in a fashion which utilizes best available techniques to minimize erosion, siltation, water quality degradation and disruption of natural habitats.
- 3) The period of inundation of a wetland should be analyzed for its potential impact upon the wetland flora and fauna and the ability of the wetland to support desirable biological life.

Activity #2 also involves the construction of a detention facility between Lots 36 and 37. This detention basin will mostly encompass upland soils, impacting a narrow wetland corridor containing a small intermittent drainageway. This basin is also proposed as mitigation for wetland impacts elsewhere on the site. The basin is to be designed in a fashion which will promote the growth of marsh vegetation. Planting of additional marsh species to facilitate marsh establishment is planned.

The creation of an open water/marsh wetland in this location appears to be acceptable. The introduction of another habitat type in this location will increase the number of vegetative communities available for wildlife, as well as increase the edge area between vegetative types. Provided that the basin is cleaned of accumulated sediments during construction and is maintained in a manner which will not disturb the vegetation once established, a basin in this location appears acceptable.

Activities #4 and #5 involve widening existing roads up to standard. The fringe impacts of the actual road widening do not pose a significant threat to the wetlands. However, during construction erosion and sedimentation often result in the most

damage to wetlands. E&S controls must be in place prior to any construction activities.

Activities #6 and #7 involve access road crossings of 2 narrow wetland corridors. The effect of the crossings on wetland functions themselves is not significant. However, these forested corridors provide wildlife with tree covered travel lanes from Wetland D to another off-site wetland. While the access road itself will not dramatically inhibit wildlife travel, destruction of a majority of the forested cover may. It is recommended that the wetland corridor up to the actual road remain forested to provide, as much as possible, a covered travel lane for wildlife.

Activity #8 is identified as a sewer crossing. This is a temporary disturbance activity. Once the line is complete, the vegetation will re-establish itself.

Summary

Generally, this application demonstrates a concerted effort to avoid wetland impacts. The crossings and fringe impacts are minor and should not result in a serious degradation of wetland habitat or functions. These are the main concerns regarding the proposed subdivision:

- 1) The construction of Detention Basin #1 is within the wetlands. This forested swamp provides attractive habitat to wildlife in its natural, undisturbed state. It is recommended that an alternative stormwater management plan be investigated to alleviate the need for a detention basin in the wetlands. Due to the slope constraints in this area, if the detention basin is absolutely essential, Best Management Practices should be implemented to reduce further degradation of the wetlands as a result of the placement of the basin.
- 2) The wetlands should be protected from degradation that may be associated with the direct discharge of stormwater. Riprap should be placed at the outlet to dissipate the velocity of discharge water. Grass-lined swales following the riprap splash pad will filter some of the pollutants that are associated with development prior to their entrance into the wetlands.
- 3) To visually enhance the final development and at the same time benefit the area's wildlife population, as many of the existing trees should be allowed to remain, giving the development a more natural quality.

WILDLIFE CONSIDERATIONS

Description of Area/Habitats

The 119-acre site, proposed for a 88-lot subdivision, is an existing farm. The majority of the land is in open quality hay fields, which are still being mowed for hay production. There are 26 acres of wetlands found on the site in addition to forestland and old field habitat. A portion of the Five Mile Brook runs through the northern section of the site.

Wildlife habitat is the complex of vegetative and physical characteristics that provide for all the requirements of wildlife, including food, shelter, resting, nesting and escape cover, water and space.

Generally, the greater the habitat diversity and degree of interspersed habitat types, the greater the variety of wildlife there is using an area. Because of the variety of habitats on the site, including open hay land, old field, forestland and wetlands, and the degree of mixing of these habitat types, the site provides good to excellent wildlife habitat. In addition, farmland habitat, open hay fields and old fields are decreasing in Connecticut. These sites are usually the easiest to develop because they have good soil quality and they offer an aesthetically pleasing landscape for the prospective owner. In addition, the site is located in an area of the State where development has been great. Therefore, a large open space area of farmland habitat offers a valuable section of this type of wildlife habitat.

Much of the farmland surrounding the site has been developed. Only to the southeast is there a large area of undeveloped forestland. Off the southwestern corner of the site, there is another large area of forestland, but it is separated from the site by some development. The open/old field habitat is extremely valuable, considering that most of the surrounding available habitat is forestland or suburban development.

A wide variety of wildlife species are expected to utilize the site to serve all their needs, while many other species find it a place to meet some requirements. These species include deer, ruffed grouse, woodcock, weasel, raccoon, fox, coyote, hawks, owls, catbirds, sparrows, juncos, bluebirds, warblers, chickadees and a variety of reptiles and amphibians (see Appendix C).

A description of the entire project along with a description of the vegetation/wildlife habitat is found within the report entitled, "Pine Hill Subdivision, Environmental Assessment of Proposed Wetland and Regulated Activities," produced by David H. Lord, Certified Soil Scientist & Environmental Consultant.

Open Hay Field/Old Field Habitat: The open hay field areas provide early successional stage habitat that has been maintained for years by mowing. These areas are dominated by planted grasses such as timothy, fescue and orchard grass. This is an important type of habitat because it provides food in the form of browse and seeds. Excellent cover is provided except when the hay is cut and for a short time after. Small mammals such as mice and voles, which attract predators such as the red fox, coyote and red-tailed hawk, thrive in this type of habitat. Various birds, including the bobolink, eastern meadowlark and the bobwhite quail, use open fields for nesting.

Insect production is higher in open areas which attracts birds of all kinds that feed on insects. Young ruffed grouse feed extensively on insects, along with many other birds, including swallows, bluebirds and flycatchers. Bats also utilize open areas to feed on insects.

The old field habitat provides greater food and cover for some wildlife species. The old field habitat with its mix of shrubs, vines and small trees, along with grasses and herbaceous growth, offers additional structural diversity due to the greater vegetational diversity.

Shrubs found in the old field habitat include multiflora rose, honeysuckle, sumac, barberry, dogwood and autumn olive, along with a variety of vines. The fence lines and stone walls between the fields are greatly overgrown and provide an abundance of food and cover to edge dwelling species. Many species of birds and mammals use this area, including deer, fox, ruffed grouse, raccoon, coyote, sparrows, gold finch, cardinal and catbird.

Open and reverting old field habitat are important types of habitat for many species of wildlife. This habitat type is often lacking or diminished in supply in some areas, partly because it is the first habitat type to be developed and the type of farming that provides for this habitat is declining.

Field areas not only increase the overall diversity of habitat, but also increase the "edge" or "edge effect." Edge effect is the phenomena that occurs where vegetational types meet with a high degree of interspersion, and vegetational diversity or richness is achieved, and the needs of a wide variety of wildlife species is met.

Forestland: Most of the forested area is located in the southerly and easterly section of the site. Areas of hardwood forest are also interspersed in the open field areas in the central portion of the site. Hardwood forest with small patches of hemlock comprise this habitat type.

Hardwood species include various oaks, American beech, hickory, white ash, black birch and red and sugar maple. Understory species include spicebush, red maple, ash and cherry. Forested areas provide an abundant source of food in the form of mast, berries, buds, insects and catkins. Nesting and roosting sites are provided. Cover is provided for species such as fox, bobcat, raccoon, deer and coyote.

The areas of hemlock increase diversity within the hardwood area and provide important year-round cover for species such as ruffed grouse and various songbirds. Stands of hemlocks are preferred nesting sites for species such as the veery and junco. The winged seeds produced by the hemlock are readily sought by red squirrel,

pine siskin and chickadees. Although not closely inspected, the hemlock looked as though it were suffering from some type of disease or insect infestation. Obviously, as it dies or declines, its ability to provide cover will decline.

The snag trees (i.e., dead trees) are a source of insects which serve as food for many species, including woodpeckers and chickadees. Den trees or trees with cavities can serve as a nesting or denning place for animals such as squirrels and raccoons.

Wetlands: Because wetlands increase the habitat diversity of an area and offer a variety of food and cover to wildlife, they are important areas to consider for protection. Acre for acre, wetlands and their associated riparian zones exceed all other land types in wildlife productivity. In addition to their value as wildlife habitat, wetlands serve other valuable functions, including water recharge, sediment filtering, flood storage, etc. For these reasons, the development of, filling in and/or crossing of wetlands should be avoided or limited whenever possible. A variety of wetlands is found on the site, including 3 areas of deciduous tree/shrub wetlands and 2 areas of open meadow type wetlands.

The deciduous tree/shrub wetlands are characterized by an overstory of tree species such as red maple, white ash, yellow birch and elm. Understory species include spicebush, winterberry, arrowwood and witch hazel. For the most part, these wetlands drain water that originates from the site itself and probably have some water flow year-round in the defined drainage channels. Because of their vegetational diversity, these wetlands are useful to a variety of wildlife species, including various songbirds, mammals, reptiles and amphibians. Wetlands with seasonally standing water can be important places for amphibian and reptile reproduction. In addition, these wetlands are close to a variety of other habitats, including upland forest and open/old field type habitat. This offers additional cover, food and nesting sites in close proximity.

The wet meadow type habitat which has resulted from agricultural drainage work is a wetland of less vegetational diversity and of somewhat less value to wildlife in general, although it provides some habitat for small mammals and various birds. There is probably less wet meadow habitat (i.e., freshwater) in the State than there is deciduous type wetlands. Both wetland types are important to wildlife.

Brooks and streams can act as corridors of travel for some species, and the area of wet meadow along Five Mile Brook provides some habitat for species using the brook as a travel corridor.

Because of the diversity of the wetlands found on the site, a variety of habitat is provided for a wide range of species that require wetlands exclusively and those that utilize wetlands along with other types of habitats. Mammals such as the fox and raccoon use these areas to forage and hunt in. Browsers such as deer feed in these areas on the diversity of vegetation. Wetlands are attractive areas for a variety of birds because of the abundant food in the form of berries, seeds and catkins.

Wildlife/Habitat Recommendations

As with any development of an undeveloped area, the impact on wildlife habitat will be negative. The impact at this site will probably be extensive because of the density of the development, addition of roads and numerous wetland crossings and construction of detention basins. Large portions of the site will be broken-up and lost with the construction of homes, driveways, roads, parking lots and walkways. Additionally, habitat will be lost where cover is cleared for lawns and landscaping. Other impacts include the increased human presence, vehicular traffic and number of free roaming dogs and cats. This could drive the less tolerant species from the immediate area of development and even areas where there has been no physical change. The value of the site for wildlife habitat will correspondingly decrease as the amount of development in the area increases.

Certain species which are adaptable to man's activities may increase due to his presence, and associated nuisances may occur. Typical species which can become a nuisance include pigeons, starlings and raccoons. Species sensitive to man's presence or the changes made at the site will either move away or perish. Deer will probably be a common occurrence in the area and in the backyards of residents. New residents should understand that successfully growing gardens or certain ornamental shrubs will probably require repellents, which have only limited effectiveness, and fencing, which can be unsightly.

Buffers: Because of the importance of wetlands to wildlife and the fact that wetlands are limited in quantity and continue to dwindle on an almost daily basis in the State of Connecticut, it is always preferable to chose the option or path of development that least impacts wetlands. The value of wetlands increases as the quantity of the resource diminishes. A buffer of at least 100 feet of undisturbed vegetation is recommended around any wetland to preserve its value and use by wildlife.

Some of the houselots contain sizeable amounts of wetlands. Ideally, all the wetlands now encompassed in the houselots, as well as a minimum 100-foot buffer, should be part of the open space. If this recommendation cannot be met, then placement of a deed restriction or covenant prohibiting any use of or change to the wetlands within houselots should be used to preserve the integrity of the wetlands. Activities such as pasturing animals in a wetland or filling them in for extra lawn and/or garden should be restricted. Additionally, a buffer of 100 feet around wetlands to preserve the vegetation can increase its usefulness after development.

Development Design: The design of this development, which contains many small lots (25,000 square feet), will augment the negative impacts to wildlife habitat by cutting up or fragmenting the habitat with houselots. Large houselots of 10 acres or more can lessen the impact of development because more habitat is preserved.

Alternatively, clustering houses, providing density is not significantly increased, on suitable land well away from wetlands will also leave more habitat undisturbed. Conventional development with small houselots does not lend itself to wildlife management such as reduction of the deer herd.

Detention Basins/Road Crossings: There are 2 detention basins proposed for the development. These detention basins are proposed to be built in and adjacent to the wetlands (Open Space "C" and "E"). Constructing detention basins in wetlands is never preferred for a variety of reasons. Wetland habitat is limited in quantity and is extremely important to a variety of wildlife species. Using wetlands for detention purposes almost always results in degraded wildlife habitat. Maintenance of the detention basin (i.e., removal of silts and sediments) is needed, but disturbs the habitat values. Additionally, water quality may be degraded from the influx of nutrients, salts, oils and other chemicals coming from residential development.

Placing detention basins in upland habitat is preferred to conserve wetland habitat. This also allows for maintenance of the detention basin with minimal disturbance to the wetlands. Detention basins, catch basins and sumps should be regularly maintained to prevent as little silt and sediment from entering the basin and eventually the wetland.

An argument might be made that creating some open water and planting additional vegetation (i.e., the proposed wetlands creation) in and adjacent to the 2 areas will increase wetland diversity. However, this would only be temporary. In time, the detention basins will tend to fill in, especially if basins are not properly maintained. This will cause the vegetational scheme to change drastically, usually resulting in a wetland of very low quality. If the silts and sediments are removed, vegetation and wildlife utilizing the habitat will be disturbed. Because of increased runoff from roads, lawns, etc., water levels in the detention basins will fluctuate much more. This can also alter vegetation and the type of wildlife that can utilize the

site. The runoff coming from developments can contain fertilizers from lawns, oils from roads and a variety of other chemicals which end up in the wetland, causing degradation to the wetland habitat by creating unfavorable water and vegetation conditions.

Roads: Roads crossing over wetlands certainly represent a negative impact to wetlands. Often times they de-water one side of the wetland and change the habitat. Roads also represent a barrier to some animals such as reptiles and amphibians and prevent these species from getting from one area to another. Small populations of these animals often live in a particular area, and the ability to travel a short distance can be important for their survival. To maintain the most habitat value, it is preferable to have a minimum number of wetland crossings and to utilize previously used or existing crossings.

Use of the "proposed alternative" road layout probably represents the least impact to wetlands and the site because much of it follows the existing farm route and its existing wetland crossings. Fewer wetland crossings and location of the detention basins out of the wetlands, if possible, will preserve more of the habitat value of the site.

Ending Summer Lane at approximately Lot 45 and adding Lots 36-46 and 48 to Open Space "D" and "E" will eliminate 2 wetland crossings. This will reduce the impacts to Wetland D and Wetland E, 2 of the more valuable wetland areas, and preserve a diverse area of habitat contiguous to the stream that runs into Five Mile Brook. If the stream corridor could be given protection from development in the future, this area of wetland, deciduous and open field habitat would make an extremely attractive area to wildlife.

Open Space Areas: Whatever type or combination of types of areas are set aside as open space, setting aside an "island of open space" surrounded by development is the least desirable for wildlife. The open space areas proposed are "islands" for the

most part, cut off by roads or proposed development. Larger open space areas (i.e., greater than 10 acres) are preferable because more species of wildlife can utilize them, and they are less prone to disturbance by surrounding development. Open space areas should be connected and, ideally, connected with open space areas outside of the development site in conjunction with a master plan for open space. The open space area should have natural travel pathways (i.e., streams, valleys and ridgetops) for wildlife 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 movement of wildlife at times. Setting aside a combination of habitat types in conjunction with wetlands is desirable.

Because the open space areas are small in size and are not connected, recreational use will be limited. The addition of trails will cause additional disturbance to these small areas and the wildlife that might use them. Only extremely short walks would be possible, which would probably not hold the interest of potential users.

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.

General Development Guidelines: In planning and constructing a development, there are steps that should be considered to minimize adverse impacts to wildlife. Despite these measures, wildlife habitat will increasingly be adversely impacted as the amount of development increases on a site. These measures include:

- 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) Stonewalls, shrubs and trees should be maintained along field borders.
- 4) Early successional stage vegetation (i.e., field) is an important 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 producing trees (i.e., oak, hickory and beech). A minimum of 5 oaks per acre, 14 inches dbh or greater should remain.
 - b) Leave 5 to 7 snag/den trees per acre because 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 or can be planted as part of the landscaping in conjunction with the development, especially those that produce fruit which persists through the winter (i.e., winterberry). See Appendix D for a list of suggested shrub and tree species that can be encouraged and/or planted to benefit wildlife.
 - e) Brush debris from tree clearing should be piled to provide cover for small mammals, birds, amphibians and reptiles.

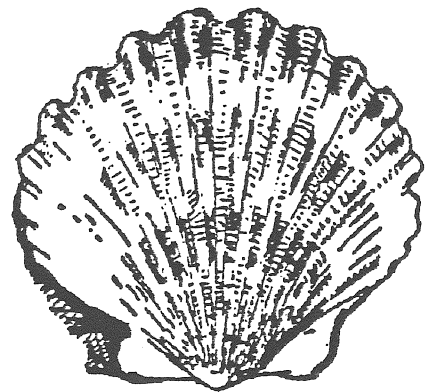
THREATENED AND ENDANGERED PLANT AND ANIMAL SPECIES

According to Natural Diversity Data Base maps and files, there are no known extant populations of Federally Endangered and Threatened species or Connecticut "Species of Special Concern" occurring at the site.

Natural Diversity Data Base information includes all information regarding critical biologic resources available at the time of the request. This information is a compilation of data collected over the years by the Natural Resources Center's Geologic 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. New information is incorporated into the Data Base as it becomes available.

ARCHAEOLOGICAL RESOURCES



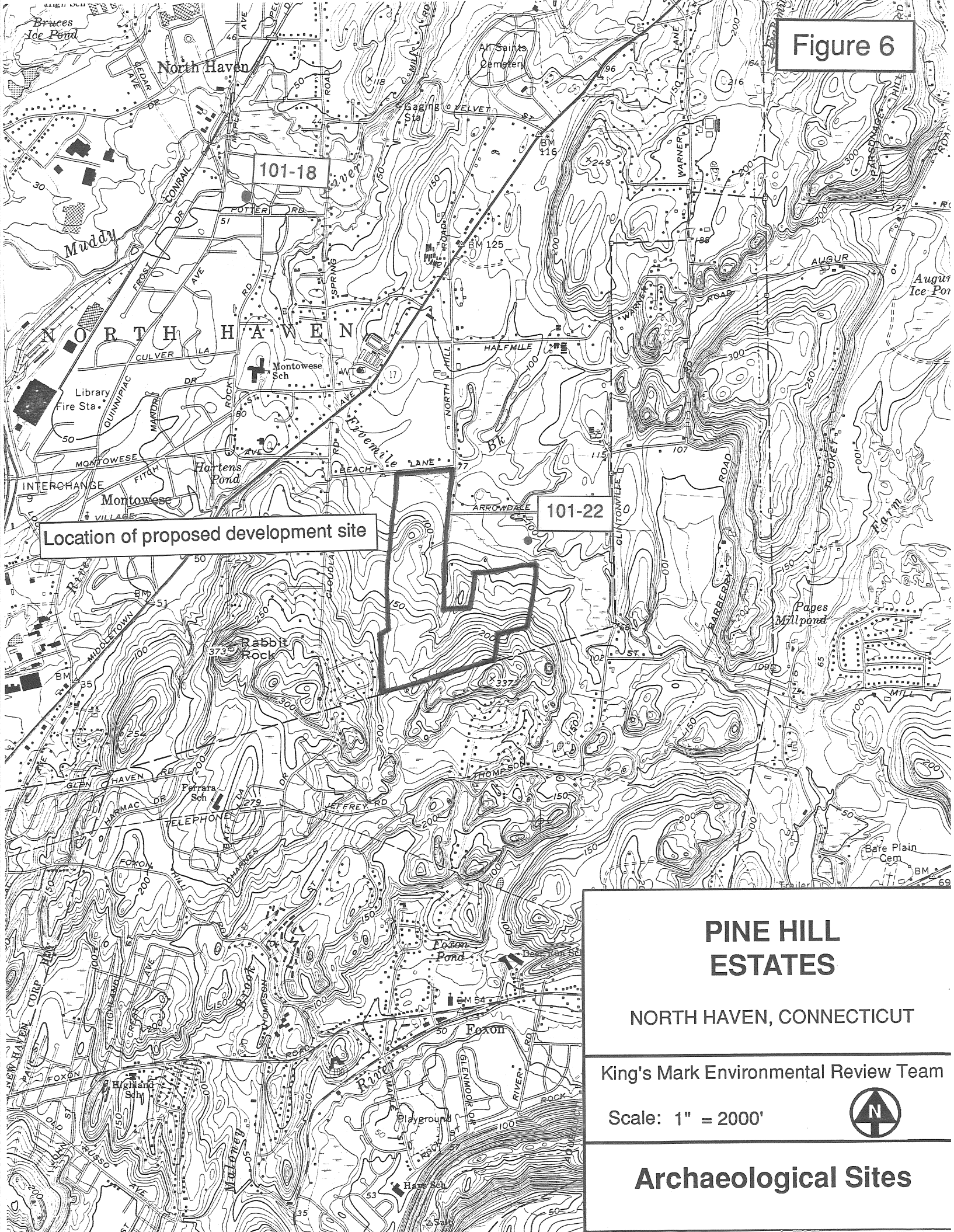
ARCHAEOLOGICAL RESOURCES

A review of the State of Connecticut Archaeological Site Files and Maps shows no archaeological sites identified on the proposed subdivision site. However, a significant Native American encampment has been located on the adjacent property at Arrowdale Farm. This site appears to have been occupied between 4,000 and 2,000 years ago and represents a limited activity site, possibly involving hunting and fishing along Five Mile Brook. Stone tools recovered from this archaeological site indicate a connection to New York State Indians.

The proposed subdivision site has similar soil, topographic features and proximity to the brook as Arrowdale Farm. As a result, the north and northeast portions of the site have a high potential for the discovery of a prehistoric Indian settlement. The Office of State Archaeology recommends an archaeological reconnaissance survey to areas indicated on Figure 6. This survey will locate and identify all cultural resources which might exist on the Pine Hill Estates Subdivision site. All archaeological studies should be undertaken in accordance with the Connecticut Historical Commission's Environmental Review Primer For Connecticut's Archaeological Resources.

The Office of State Archaeology is prepared to offer any technical assistance to the Town of North Haven and the property owners to ensure the preservation and conservation of all cultural resources on the site.

Figure 6



Location of proposed development site

101-22

101-18

PINE HILL ESTATES

NORTH HAVEN, CONNECTICUT

King's Mark Environmental Review Team

Scale: 1" = 2000'



Archaeological Sites

LAND USE AND PLANNING CONSIDERATIONS



PLANNING CONSIDERATIONS

Site Location and Land Use

The latest revision of the Pine Hill Estates Subdivision site plan application creates 88 residential single-family lots on 119 acres of land zoned R-40 (i.e., minimum lot size of 40,000 square feet or approximately 1 acre). The subdivision requires approval by both the Inland Wetlands Commission and the Planning and Zoning Commission. Applications are presently being processed through both Commissions.

The site lies in the southeast quadrant of the Town. The predominant land use is currently a mixture of medium and low density residential neighborhoods. The general land use in the area has gone through a recent transformation from active agricultural land to medium density residential land use. Although the underlying zone is currently R-40, the applicant will utilize the "reduced lot area" provision set forth in Section 4.3 of the North Haven Zoning Regulations.

Compliance with Local Zoning and Subdivision Regulations

The reduced lot area provision included in the North Haven Zoning Regulations reads:

4.3 Special Regulation for Subdivisions

In the case of the subdivision of land in any R-40 or R-20 Residence District, in accordance with a plan of subdivision and with the approval of the Planning and Zoning Commission, the minimum lot area and minimum lot width may be reduced as herein provided if the total number of lots in such subdivision does not exceed the number obtained by dividing the area of the parcel to be so subdivided, exclusive of proposed streets and land dedicated for open space, by the respective minimum lot areas required in such districts and further provided that the proposed subdivision is serviced by public water supply and/or public sanitary sewers. Any land in excess of that placed within each lot under the provisions of this paragraph and in accordance with the provisions of Section 5.2 of the Subdivision Regulations shall be designated as permanent community open space and shall be dedicated to the Town of North Haven or to a community or improvement

association approved by the Planning and Zoning Commission, to be retained for recreation or conservation purposes. The land so designated as permanent community open space shall be of a character and area suitable for the above purposes and shall conform to the requirements as set forth in said Section 5.2 of the Subdivision Regulations. In accordance with the above provisions, the minimum lot area and lot width may not be less than the following:

District	Minimum Lot Area	Minimum Lot Width
R-40	25,000 square feet	125 feet
R-20	17,000 square feet	90 feet

Section 5.2 of the Subdivision Regulations:

The Planning and Zoning Commission may require such open space for parks and playgrounds as it may deem proper, accessible to all lots from public ways. Such open spaces, if required, may be at the rate of not less than 1 acre for every 50 families. In smaller subdivisions, the Commission may require suitable open spaces for parks and playgrounds either separately, or in combination with adjacent or neighboring subdivisions. The subdivider shall make provision for the permanent maintenance of such park or playground areas, either by conveyance to the Town, by the establishment of a duly organized improvement association or neighborhood association or by other means, all as approved by the Planning and Zoning Commission.

The applicant meets the minimum requirements of Section 4.3 of the Zoning Regulations and Section 5.2 of the Subdivision Regulations. The 2 adjacent residential subdivisions (one built and the other approved) have utilized the same zoning provision to reduce the required minimum lot area and frontage in their subdivision design concepts. The Planning and Zoning Commission has recently adopted a cluster development ordinance which replaces the reduced lot provision (Section 4.3). The new cluster ordinance improves on many of the deficiencies present in the current reduced lot provision, notably better standards and criteria for open space parcels and calculation of allowable lots. The new cluster regulation is an improvement in terms of preserving unique land features, but arrives too late to affect site plan design for the proposed subdivision. Adjacent built and approved

residential developments have already incorporated conventional single-family residential design options and altered the rural low density character.

Compliance with Other Town Plans /Goals

The Planning and Zoning Commission adopted a Master Plan of Development in 1982. In the Land Use Plan, the site was characterized as being low density residential due to the rugged and scenic character and the absence of public sewers and water lines. Since that time, the special provisions in the Zoning Regulations and the approved construction of sewer lines for the site have changed the residential character of the area from low density residential development, to a more conventional medium density design.

If a community wants to achieve certain goals stated in its Master Plan, then effective ordinances and review processes must be carefully administered. The "new" Cluster Zoning Regulation, replacing Section 4.3, will allow Commission members to review different design alternatives for individual parcels. A graphical presentation should effectively illustrate the difference between creative and conventional subdivision design without necessarily building in excess cost.

Traffic Analysis

The consulting firm of Barakos and Landino have conducted a Traffic Impact/ Site Access study for the proposed subdivision. The report recommends that a traffic signal be installed at the intersection of Middletown Avenue-Montowese Avenue along with stop signs to control traffic at intersecting roadways. By implementing these minor traffic control improvements, the report concludes that the traffic impact of the proposed subdivision will be negligible.

The report indicates that 2 intersections, Montowese Avenue-Middletown Avenue and Middletown Avenue-Spring/Cloudland Roads, are currently operating at the lowest level of service during one or more peak hours. The proposed traffic signal along Route 17 will improve the Montowese Avenue intersection. The

intersection of Montowese Avenue-Middletown Avenue had the highest frequency of accidents and would benefit more, from a safety point of view, with the added signalization. The level of service and safety to Route 17 and Cloudland/Spring Roads must also be considered.

The report does not mention any possible impact on adjacent road networks, but it is assumed that the majority of the traffic will access Cloudland Road via Beach Road to connect with Montowese Avenue, Spring Road and Middletown Avenue. The direct impact on the neighborhoods and road networks within East Haven appears to be negligible. Most of the trips to the south on Cloudland Road will be local shopping runs.

Open Space

Whether a Homeowners Association or the North Haven Land Trust will provide ownership and accept responsibility for the open space areas should be determined before any approvals are granted. Maintenance responsibility must be finalized for the 2 detention basins designed within the regulated inland wetlands. The open space areas are of an adequate size, shape and accessible to all lots within the subdivision. The Town Plan of Development highlights the importance and general recommendations for open space preservation and recreation within the community. The southeast corner of the community is planned for increased population density which corresponds to a need for increased recreational opportunities for all ages. Potential playground and community recreational facilities may be appropriate for some of the open space land being dedicated.

REFERENCES

Flint, R.F., 1964, The surficial geology Branford Quadrangle with map. State Geol. and Nat Hist. Surv. of CT, Quad. Rpt. #14, 45 p.

Rodgers, John (compiler), 1985, Bedrock Geological Map of Connecticut. State Geol. and Nat. Hist. Surv. of CT, Nat. Res. Atlas Ser., 2 Sheets.

APPENDICIES



Appendix A: Soil Limitations Chart

MAJOR LIMITATIONS TO THE DEVELOPMENT OF:

MAP UNIT NAME	GENERAL SOIL PROPERTIES	SEASONAL HIGH WATER TABLE	HOMES WITH BASEMENTS	LAWNS/ LANDSCAPING	PATHS AND TRAILS	ROADS AND STREETS
AA - Adrian and Palms Mucks	Organic soils in low depressions on outwash terraces and glacial till plains	Very poorly drained +1.0-1.0 ft.	Subsides, ponding	Ponding, excess humus	Ponding, excess humus	Subsides, ponding, frost action
†BoB - Branford silt loam, 3-8% slopes	Deep soils on outwash plains and stream terraces formed in water deposited sand and gravel	Well-drained > 6 ft.	None	None	None	Frost action
†CsB - Cheshire fine sandy loam, 3-8% slopes	Very deep soils on uplands formed in glacial till derived mainly from red sandstone, shale and conglomerate	Well-drained > 6 ft.	None	None	None	None
°CsC - Cheshire fine sandy loam, 8-15% slopes	Very deep soils on uplands formed in glacial till derived mainly from red sandstone, shale and conglomerate	Well-drained > 6 ft.	Slope	Large stones, slope	Slope	Slope
CyC - Cheshire-Holyoke complex, 15-35% slopes	Cheshire: Very deep soils on uplands formed in glacial till derived mainly from red sandstone, shale and conglomerate Holyoke: Shallow soils on uplands formed in a thin mantle of glacial till over basalt bedrock	Well-drained > 6 ft.	Slope	Large stones, slope	Slope	Slope
		Well-drained and somewhat excessively drained > 6 ft.	Depth to rock, slope	Thin soil layer	None	Depth to rock, slope

MAJOR LIMITATIONS TO THE DEVELOPMENT OF:

MAP UNIT NAME	GENERAL SOIL PROPERTIES	DRAINAGE CLASS AND DEPTH TO SEASONAL HIGH WATER TABLE				MAJOR LIMITATIONS TO THE DEVELOPMENT OF:		
		HOMES WITH BASEMENTS	LAWNS/ LANDSCAPING	PATHS AND TRAILS	ROADS AND STREETS			
†Eh - Ellington silt loam	Very deep soils on glaciofluvial landforms formed in loamy over sandy and gravelly glacial outwash derived from red sedimentary rocks and basalt	Wetness	Wetness	Wetness	Frost action			
HUD - Holyoke-Cheshire complex, 15-35% slopes	Holyoke: Shallow soils on uplands formed in a thin mantle of glacial till over basalt bedrock Cheshire: Very deep soils on uplands formed in glacial till derived mainly from red sandstone, shale and conglomerate	Depth to rock, slope	Slope, thin soil layer	Slope	Depth to rock, slope			
HZE - Holyoke-rock outcrop complex, 15-35% slopes	Shallow soils on uplands formed in a thin mantle of glacial till over basalt bedrock	Depth to rock, slope	Large stones, slope	Slope	Depth to rock, slope			
LuB - Ludlow very stony silt loam, 3-8% slopes	Very deep soils on uplands formed in glacial till derived mainly from red sandstone	Wetness	Wetness	Wetness	Frost action			
◦MgC - Manchester gravelly sandy loam, 8-15% slopes	Deep soils on terraces formed in glacial outwash deposits	Slope, large stones	Droughty, slope	Slope	Slope			

MAJOR LIMITATIONS TO THE DEVELOPMENT OF:

MAP UNIT NAME	GENERAL SOIL PROPERTIES	SEASONAL HIGH WATER TABLE	HOMES WITH BASEMENTS	LAWNS/ LANDSCAPING	PATHS AND TRAILS	ROADS AND STREETS
*°Ra - Raynham silt loam	Very deep soils on lake plains formed in silty estuarine or glaciolacustrine deposits	Poorly drained 0.5-2.0 ft.	Wetness	Wetness	Wetness, erodes easily	Frost action, wetness
*°Rb - Raypol silt loam	Very deep soils on terraces and plains formed in loamy over sandy and gravelly glacial outwash	Poorly drained 0-1.0 ft.	Wetness	Wetness	Wetness	Wetness, frost action
†WcB - Watchaug fine sandy loam, 3-8% slopes	Deep soils on uplands formed in glacial till derived mainly from red sandstone and conglomerate	Moderately well-drained 1.5-2.5 ft.	Wetness	Large stones, wetness, slope	Wetness	Frost action
WkD - Wethersfield loam, 15-25% slopes	Very deep soils formed in glacial till derived mainly from red sandstone, shale and conglomerate	Well-drained 1.5-2.5 ft.	Slope	Slope	Slope	Slope
*Ws - Wilbraham very stony silt loam	Very deep soils on uplands formed in glacial till derived from red sandstone, shale and conglomerate	Poorly drained 0-1.5 ft.	Wetness	Wetness	Wetness	Wetness, frost action

MAJOR LIMITATIONS TO THE DEVELOPMENT OF:

MAP UNIT NAME	GENERAL SOIL PROPERTIES	SEASONAL HIGH WATER TABLE	HOMES WITH BASEMENTS	LAWNS/ LANDSCAPING	PATHS AND TRAILS	ROADS AND STREETS
*Wt - Wilbraham and Menlo extremely stony silt loam	Wilbraham: Very deep soils on uplands formed in glacial till derived from red sandstone, shale and conglomerate Menlo: Deep soils on uplands formed in glacial till derived mainly from red sandstone, shale and conglomerate	Poorly drained 0-1.5 ft.	Wetness	Wetness	Wetness	Wetness, frost action
		Very poorly drained +1.0-0.5 ft.	Ponding	Ponding	Ponding	Ponding, frost action

*Inland wetland soil

†Prime Farmland soil

°Additional Farmland of Statewide Importance

Appendix B: Erosion and Sediment Control Plan Worksheet

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: Species List By Habitat for New Haven County

CONNECTICUT SPECIES DATABASE
WILDLIFE BUREAU
WESTERN DISTRICT HEADQUARTERS

SPECIES LIST BY HABITAT FOR NEW HAVEN COUNTY

This is a list, generated from the Connecticut Wildlife Species Database, of the potential or possible species that could occur in the habitat types found on the proposed development site. Specific habitat choices are available for which a species list based on county can be generated. Habitat types on this site include: Deciduous Woodland, Coniferous Woodland, Old Field, Woodland Ecotone and Palustrine Forested Wetland. The habitat type selection does not provide for Open Hay Field or Palustrine Wetlands altered to Wet Meadow by agriculture. However, the list should still be useful in providing an idea of the wildlife species that could potentially use the site. This list does not guarantee that these species will be present, but that they may potentially occur there, depending on a number of other factors.

SPECIES	D W	C W	W E	O F	P F O
Marbled Salamander	X				
Jefferson Salamander	X				X
Blue-spotted Salamander					X
Spotted Salamander	X				X
Red-spotted Newt	X				
Northern Dusky Salamander					X
Redback Salamander		X			
Slimy Salamander	X	X			
Four-toed Salamander					X
Northern Spring Salamander	X	X			X
Northern Two-lined Salamander	X	X			X
Eastern Spadefoot	X	X		X	
American Toad	X	X	X	X	
Fowler's Toad	X	X			X
Northern Spring Peeper	X	X			X
Greater and Lesser Grey Treefrog			X	X	
Wood Frog	X	X			X
Northern Leopard Frog				X	X
Wood Turtle	X		X	X	X
Eastern Box Turtle	X	X	X	X	X
Five-lined Skink	X				
Northern Brown Snake	X	X	X	X	X
Northern Redbelly Snake	X	X			X

SPECIES	D	C	W	O	P
	W	W	E	F	O
Eastern Garter Snake	X	X	X	X	X
Eastern Ribbon Snake	X	X	X		X
Eastern Hognose Snake	X	X	X	X	X
Northern Ringneck Snake	X	X			
Eastern Worm Snake	X	X		X	X
Northern Black Racer	X	X	X	X	X
Eastern Smooth Green Snake	X			X	X
Black Rat Snake	X		X	X	X
Eastern Milksnake	X	X	X	X	X
Canada Goose				X	
Mallard					X
Turkey Vulture	X		X	X	X
Northern Harrier (Marsh Hawk)					X
Sharp-shinned Hawk	X	X	X	X	
Cooper's Hawk	X		X	X	X
Goshawk	X	X			
Red-shouldered Hawk	X		X		X
Broad-winged Hawk	X	X			
Red-tailed Hawk	X	X	X	X	X
American Kestrel			X	X	
Ring-necked Pheasant				X	
Ruffed Grouse	X			X	
Eastern Wild Turkey				X	
Northern Bobwhite			X	X	
Killdeer				X	
American Woodcock			X	X	
Rock Dove				X	
Mourning Dove	X	X	X	X	
Black-billed Cuckoo	X	X	X	X	
Yellow-billed Cuckoo	X	X	X	X	X
Barn Owl				X	
Screech Owl	X	X	X	X	
Great Horned Owl	X	X	X		X
Barred Owl	X	X			X
Long-eared Owl	X	X		X	X
Northern Saw-whet Owl	X	X			X
Common Nighthawk				X	
Whip-poor-will	X				
Ruby-throated Hummingbird					X
Belted Kingfisher					X
Red-headed Woodpecker	X		X		X
Downy Woodpecker			X		X
Hairy Woodpecker	X	X			X
Northern Flicker	X	X	X	X	

SPECIES	D	C	W	O	P
	W	W	E	F	O
Wood Pewee	X				
Acadian Flycatcher	X				X
Willow Flycatcher			X	X	
Least Flycatcher	X		X	X	
Eastern Phoebe	X	X	X		
Great Crested Flycatcher	X		X		X
Eastern Kingbird			X	X	
Tree Swallow					X
Northern Rough-winged Swallow				X	
Cliff Swallow			X		
Blue Jay	X	X			
Common Crow	X	X	X		
Black-capped Chickadee	X	X			X
Tufted Titmouse	X				X
Red-breasted Nuthatch		X			
White-breasted Nuthatch	X				
Brown Creeper	X	X			X
Carolina Wren			X	X	
House Wren			X	X	X
Winter Wren		X			X
Blue-gray Gnatcatcher	X				X
Eastern Bluebird			X	X	
Veery	X				X
Swainson's Thrush	X	X			
Wood Thrush	X				X
American Robin	X		X	X	
Golden-crowned Kinglet		X	X		
Gray Catbird			X		
Northern Mockingbird			X	X	
Brown Thrasher			X	X	
Cedar Waxwing	X	X			X
European Starling				X	
White-eyed Vireo			X	X	
Yellow-throated Vireo	X			X	X
Warbling Vireo	X				
Red-eyed Vireo	X				
Blue-winged Warbler			X	X	
Golden-winged Warbler	X			X	
Nashville Warbler	X		X	X	X
Yellow Warbler				X	
Chestnut-sided Warbler			X	X	
Yellow-rumped Warbler (Myrtle)		X	X		
Black-throated Green Warbler		X			
Pine Warbler			X		

SPECIES	D	C	W	O	P
	W	W	E	F	O
Cerulean Warbler	X				
Black-and-white Warbler	X				
American Redstart	X		X		
Worm-eating Warbler	X				
Ovenbird	X	X			
Northern Waterthrush					X
Louisiana Waterthrush					X
Common Yellowthroat			X	X	
Canada Warbler	X	X			X
Yellow-breasted Chat				X	
Scarlet Tanager	X		X		X
Northern Cardinal			X	X	
Rose-breasted Grosbeak			X	X	
Indigo Bunting			X	X	
Rufous Sided Towhee			X	X	
Chipping Sparrow			X		
Field Sparrow			X	X	
Savanna Sparrow				X	
Grasshopper Sparrow				X	
Henslow's Sparrow				X	
Song Sparrow				X	
White-throated Sparrow			X	X	
Bobolink				X	
Red-winged Blackbird				X	
Eastern Meadowlark				X	
Common Grackle				X	
Brown-headed Cowbird	X	X	X		
Orchard Oriole			X	X	
Northern Oriole (Baltimore)			X	X	
Purple Finch		X	X		
House Finch				X	
American Goldfinch			X	X	
Evening Grosbeak		X			
Virginia Opossum	X				X
Masked Shrew	X	X			X
Water Shrew					X
Smoky Shrew	X				
Short-tailed Shrew	X	X		X	
Least Shrew			X	X	
Hairy-tailed Mole	X		X	X	
Eastern Mole				X	
Star-nosed Mole				X	
Snowshoe Hare	X	X			
European Hare				X	

SPECIES	D W	C W	W E	O F	P F O
Eastern Chipmunk			X		
Woodchuck			X	X	
Little Brown Myotis					X
Keen's Myotis			X	X	
Silver-haired Bat	X	X			X
Eastern Pipistrelle	X	X			X
Big Brown Bat	X	X			
Red Bat	X	X	X		
Hoary Bat	X	X			
Eastern Cottontail	X	X	X	X	X
New England Cottontail	X	X	X	X	X
Grey Squirrel	X				
Red Squirrel	X	X			
Southern Flying Squirrel	X				
White-footed Mouse	X	X	X	X	
Meadow Vole				X	X
Woodland Vole	X			X	
Southern Bog Lemming	X			X	
House Mouse			X	X	
Meadow Jumping Mouse			X	X	
Woodland Jumping Mouse	X	X			
Coyote			X	X	
Red Fox			X	X	
Gray Fox	X				X
Raccoon			X	X	
Short-tailed Weasel				X	
Long-tailed Weasel			X	X	
Striped Skunk			X	X	
White-tailed Deer	X	X	X	X	X

Habitat selections for New Haven County

DW	Deciduous Woodland
CW	Coniferous Woodland
OF	Old Field
WE	Woodland Ecotone
PFO	Palustrine Forested Wetland

Appendix D: Suitable Planting Materials for Wildlife Food and Cover

SUITABLE PLANTING MATERIALS FOR WILDLIFE FOOD AND COVER

Herbaceous/Vines

Panicgrass
Timothy
Trumpet creeper
Grape
Birdsfoot trefoil
Virginia creeper
Switchgrass
Lespedeza
Bittersweet
Boston ivy

Shrubs

Sumac
Dogwood
Elderberry
Winterberry
Autumn olive
Blackberry
Raspberry
Honeysuckle
Cranberrybush

Small Trees

Hawthorn
Cherry
Serviceberry
Cedar
Crabapple

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 - an 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 through 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 land owner/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 approximately two (2) reviews per month.

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