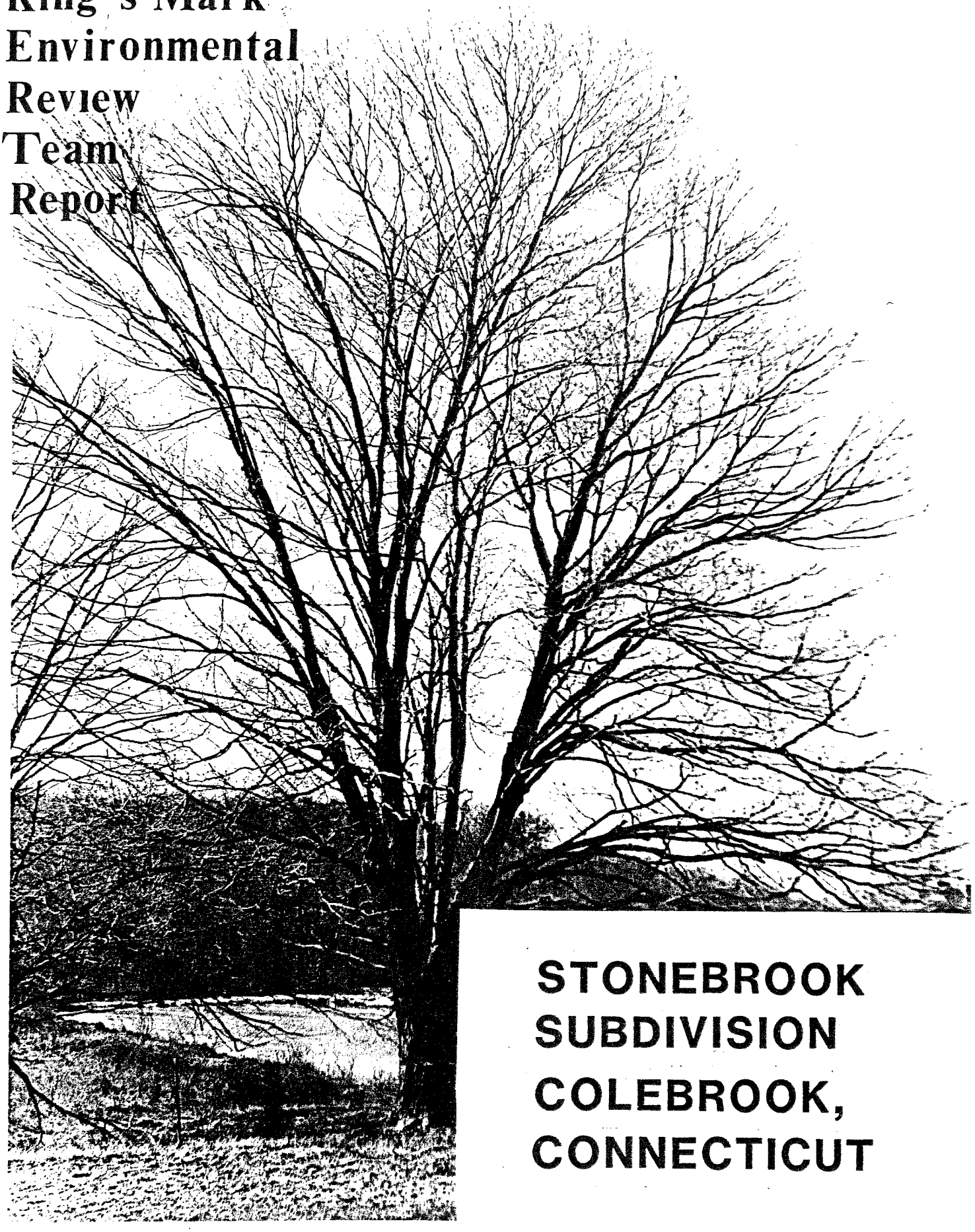
King's Mark Environmental Review Team Report



STONEBROOK SUBDIVISION COLEBROOK, CONNECTICUT

STONEBROOK SUBDIVISION

COLEBROOK, 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

Colebrook 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.

MAY 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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  Litchfield Hills Council of Elected Officials

* Frank Schaub, Sanitarian
  State of Connecticut - Department of Health Services

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

Finally, special thanks to Norman Thompson and Diana Holcomb of the Colebrook Inland Wetlands Commission, Ed Koehey, Jr. and Evelyn Crane of the Colebrook Planning and Zoning Commission, George Wilber, First Selectmen of Colebrook and Wilson Alford, developer, and Karl Nilsen, Stonebrook Associates, for their cooperation and assistance during this environmental review.

EXECUTIVE SUMMARY

Introduction

The Colebrook Inland Wetlands Commission has requested that an environmental review be conducted on Stonebrook, a site proposed for a subdivision development. The site is located in the western section of town, bordering the town of Norfolk. The site is divided into three sections for a total of approximately 520 acres. Sections 1 and 2 are currently being subdivided and are the object of this request. Section 1, an approximately 40-acre site, is characterized by second growth, mixed hardwood forest, steep slopes and some wetlands. Section 2, an approximately 89-acre site, is characterized by second growth, mixed hardwood forests, wetlands and former agricultural lands. Both sections abut the extensive wetland system of Loon Brook. The wildlife populations are enhanced by the varied habitats (wetlands, open fields, forested land). Pine Hill Road is a single lane unimproved road which is currently used by the local population for hiking.

The proposed subdivision would encompass 20 house lots, 8 for Section 1 and 12 for Section 2. No roads are proposed to serve the subdivision but Pine Hill Road will need to be improved to support the subdivision development. The subdivision would rely upon on-site septic and water systems.

The Town was primarily concerned with the potential impact that the proposed development would have on: (1) existing wetland corridors; (2) effects of erosion and sedimentation; (3) wildlife habitat; 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; and (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, Land Use and Topography

The site is located in west central Colebrook. Section 1 is located on a rock cored hill. Topographic conditions are controlled by the underlying bedrock. Maximum and minimum elevations range from 1,360 to 1,240 feet above sea level, respectively. Section 2 flanks the east side of a drumlin. Slopes range from flat to moderate. Maximum and minimum elevations range between 1260 and 1180 feet above sea level, respectively.

Geology

Both Sections 1 and 2 are covered by glacial sediments called till. The till in Section 1 is generally loose and sandy. A more compact variety may be found in the northern parts. The till in Section 2 is relatively deep and compact. Silty, compact soils commonly result in seasonally elevated water tables, soil mottling and slow percolation rates. Regulated inland wetland soils are found in both sections.

The bedrock in Section 1 has been identified as a dark gray, rusty weathering schist and gneiss. Included with this is a band of garnet rich amphibolites and a band of granite. The bedrock in Section 2 consists of gray, medium grained, well layered gneisses. The schist, amphibolite and gneisses are metamorphic in origin and have long complex histories. The granite intruded as molten materials into the older rock. The amphibolite is also presumed to have a volcanic origin. The bedrock will serve as the source of water to the subdivision.

Geologic Development Concerns

Geologic limitations on the site include: (1) lots with shallow to bedrock conditions, (2) lots with moderate to steep slopes, and (3) till soils with a hardpan layer. These will limit the ability to provide subsurface sewage disposal. Special engineered design plans will be needed on most lots to overcome the limitations.

The presence of bedrock at shallow depths, especially in Section 1, suggests that blasting will be required for driveways, foundations, septic systems and distribution lines. All blasting should be done carefully and under the strict supervision of experienced people.

Water Supply

The underlying bedrock is the likely source of water for the subdivision. Although not prolific aquifers, the crystalline bedrock is capable of yielding quantities sufficient for domestic uses. The presence of a fault aligned with Loon Brook suggests that the bedrock surface is fractured and weathered. These fractures provide the storage of groundwater in the bedrock. Wells should be located on the high side of lots, away from sources of pollution. Drilled wells generally afford the greatest level of protection. The natural quality of the groundwater should be good. There may be a chance of elevated iron and manganese levels, especially in Section 1. It may be necessary to install appropriate treatment systems.

Hydrology

Drainage from the entire site flows into Loon Brook. Sections 1 and 2 represent 3 percent of the drainage area, the entire site is 11 percent of the drainage area. Surface runoff from Sections 1 and 2 flows into an extensive wetland system. The natural detention capabilities of this wetland system should be very high.

Groundwater in the area is classified and GA, which means it is suitable for private drinking water supplies. Homeowners should be very careful with the disposal of certain chemicals to avoid contaminating the groundwater system.

Development of the site will result in increased runoff. In view of the low densities, the increase should be low. The natural detention capabilities of the wetlands should alleviate the potential for flooding. One concern with the increased runoff is the potential for erosion and sedimentation. Because of the moderate and steep slopes and silty soils, a thorough erosion and sediment control plan should be followed. The best solution for control is to keep disturbed areas to a minimum.

Soil Resources

The soils on the site include: Alluvial land, Charlton fine sandy loam, Hollis rocky fine sandy loam, Paxton fine sandy loam, Peat and Muck and Woodbridge fine sandy loam. Soil limitations include slope, wetness, shallow bedrock and frost heaving. These limitations do not preclude development but do indicate the need for more precise planning, especially for septic systems. Phasing construction activity, especially on steep slopes, in conjunction with erosion and sediment controls should minimize soil loss and degradation.

The eastern boundary of Section 2 is within the Zone A of the 100 year flood boundary of Loon Brook. The 100 year flood boundary does not occur in Section 1.

The erosion and sediment control plan for the subdivision is generally adequate. Comments include suggestions for further details and better protection of the property. Proper maintenance is the key to successful erosion and sediment control.

Wetland Considerations

The wetlands in Section 1 are located in the eastern part. The dominant plant species are hemlock and red maple. The wetlands are considered to be of high value with respect to wildlife habitat. They are important in maintaining the hydrologic stability of the area. Other functions include water purification, sediment filtration and flood water storage. The development involves no direct disturbance to these wetlands. However, indirect impacts may occur from sedimentation and debris dumping. Suggestions include the proper installation and maintenance of erosion and sediment controls and prohibiting the dumping of debris in the wetlands.

The wetlands in Section 2 are located in the eastern part. These wetlands are more diverse than those in Section 1, containing several ecological niches. The wetland values are the same as those in Section 1. Direct disturbances include four driveway crossings. Indirect disturbances include several houses and septic systems close to the wetlands. Machinery may have to excavate in the wetlands to grade the septic systems. Alternatives include a reduction in the number of lots to reduce the number of crossings or combining driveways. The Commission needs to look closely at the plans and evaluate all feasible and prudent alternatives.

Wildlife Considerations

Section 1 contains a mixed hardwood forest and wetlands. While not diverse, this area does offer habitat to those species that use forested areas. The wetlands are very important to wildlife because of the great diversity they provide.

Section 2 contains open fields, mixed hardwood forest and wetlands. The wetlands in this section are very diverse, containing areas of open water, shrub swamp and forest. This area offers excellent wildlife habitat.

As with any development, the impact on wildlife habitat will be negative. The area will be broken up and lost with the construction of driveways, walkways, parking areas and homes. Other impacts include the creation of lawns

and introduction of humans, traffic, dogs and cats. There are many steps that can be taken in order to make the area more suitable for wildlife. These include buffer strips, natural landscaping techniques, maintaining forest wildlife requirements and providing nesting boxes for birds. Large lots would help to minimize the impacts on wildlife as would cluster development.

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.

Natural Area Inventory Site

Phelps Pond Bog, located in Section 3, is a Natural Area Inventory site. It is one of 459 sites set aside by the Connecticut Forest and Park Association in 1972. A site receives no legal protection by being included on the Natural Area Inventory list.

Planning Considerations

The site is located in a rural residence zone. The surrounding land is also zoned for rural residential development. Surrounding land uses include undeveloped woodland, wetlands, farms and residences. The project appears to be compatible with existing and proposed land uses in the area.

The State Policies Plan for the Conservation and Development of Connecticut, 1987-1992 identifies the area as "rural land." This designation allows development if it has on-site water and septic systems and is consistent with the rural character of the adjacent areas. The Loon Brook wetland system is identified as a preservation area. The project appears to be consistent with the state plan, the Litchfield Hills CEO preliminary housing policy and the zoning regulations of Colebrook.

Phelps Road is in good condition and should adequately serve the subdivision. Pine Hill Road will require upgrading. The combined subdivision would be expected to add approximately 200 vehicular trips per day to the surrounding roadways.

Comments on the design include using a conservation easement rather than a deed restriction to protect the meadows, easing the restrictions on the open space to allow passive recreation and reducing the number of curb cuts onto Phelps Road by combining some of the driveways.

Septic Considerations

Section 1 is steeply sloped with little soil cover in the western part. Many of the septic systems are located considerable distances from the houses. Both the septic tank and the distribution lines must be constructed so that sewage will not leak onto the bedrock. The soils of the primary and reserve leaching fields appear to be suitable. Each of the lots will require detailed engineering design plans. One concern on Lot 3 is the stone wall which may serve as a conduit for groundwater. Lot 3 is wide enough so that the leaching fields can be moved to avoid the stone wall.

Section 2 does not have ledgerock as the restrictive factor. The soils should be suitable for leaching fields. The major restrictive factor is the seasonal high groundwater and the proximity of the wetlands. Two of the houses will have the sewage pumped. Proper design of the septic systems should assure no adverse impacts to the wetlands. Detailed engineering plans will be required for many of the lots due to high groundwater level.

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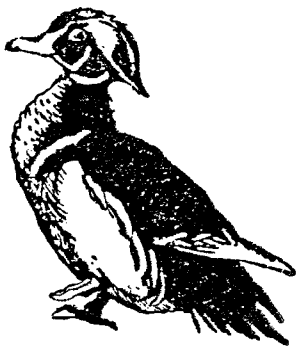
INTRODUCTION



INTRODUCTION

The Colebrook Inland Wetlands Commission has requested that an environmental review be conducted on Stonebrook, a site proposed for a subdivision development. The site is located in the western section of town, bordering the town of Norfolk. Access is provided by Phelps Road and Pine Hill Road in Colebrook.

The site is divided into three sections for a total of approximately 520 acres. Sections 1 and 2 are currently being subdivided and are the object of this request. Section 1, an approximately 40-acre site, is characterized by second growth, mixed hardwood forest, steep slopes and some wetlands. Section 2, an approximately 89-acre site, is characterized by second growth, mixed hardwood forests, wetlands, and former agricultural lands. Both sections abut the extensive wetland system of Loon Brook. The wildlife populations are enhanced by the varied habitats (wetlands, open fields, forested land). Pine Hill Road is a single lane unimproved road which is currently used by the local population for hiking.

The proposed subdivision would encompass 20 house lots, 8 for Section 1 and 12 for Section 2. No roads are proposed to serve the subdivision but Pine Hill Road will need to be improved to support the subdivision development. The subdivision would rely upon on-site septic and water systems.

This report addresses Section 1 and Section 2 of the proposed subdivision. From a hydrogeologic and planning standpoint, the Town might want to consider requesting a Review for the remaining 391 acres, which represents 75 percent of the total parcel. A cursory review of hydrogeologic and soil mapping information indicates that the cumulative impacts from such a large development should be closely scrutinized.

THE ERT PROCESS

Through the efforts of the Colebrook Inland Wetlands Commission, the developer's representative 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 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 April 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.

Figure 1

LOCATION OF STUDY SITE

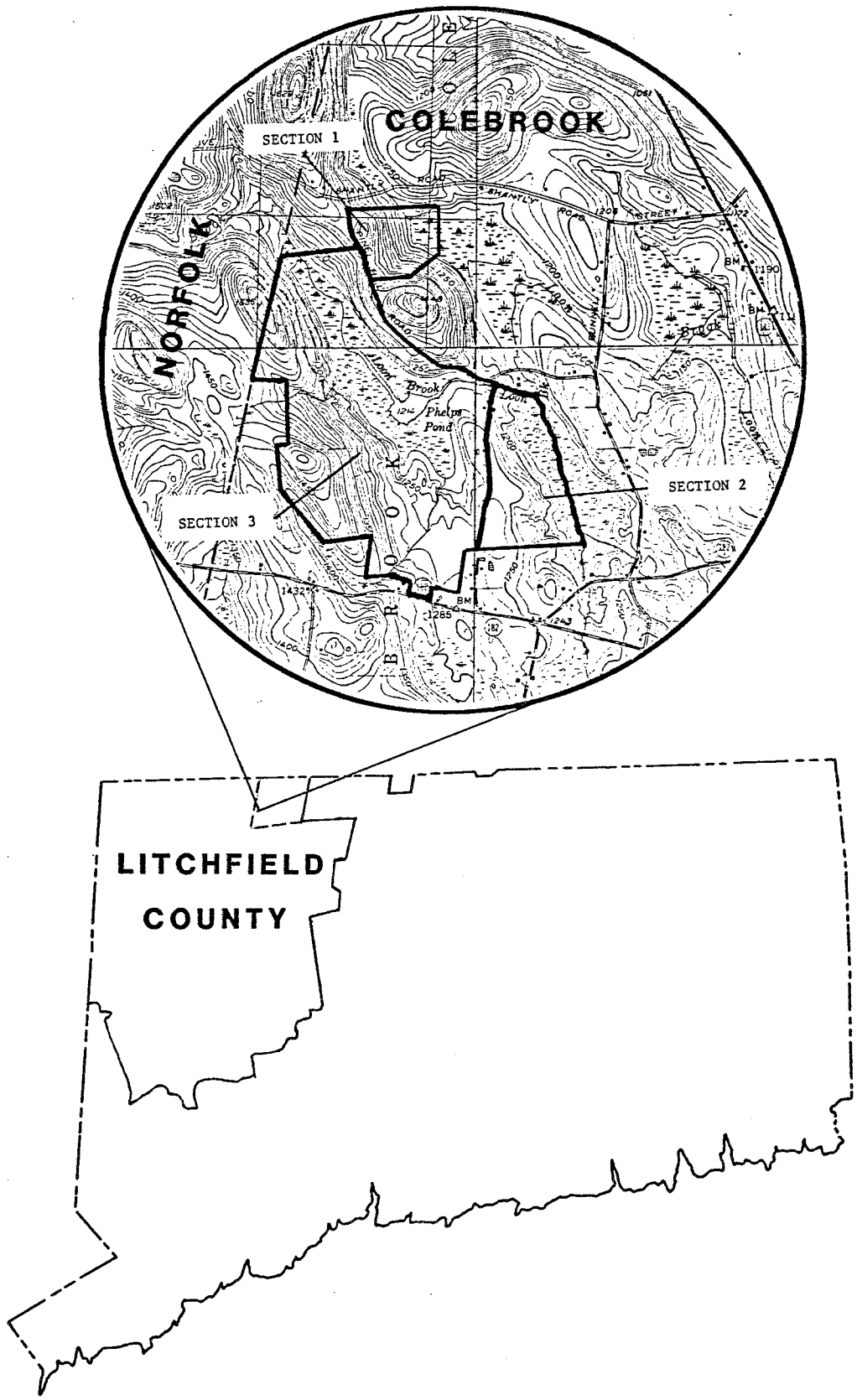
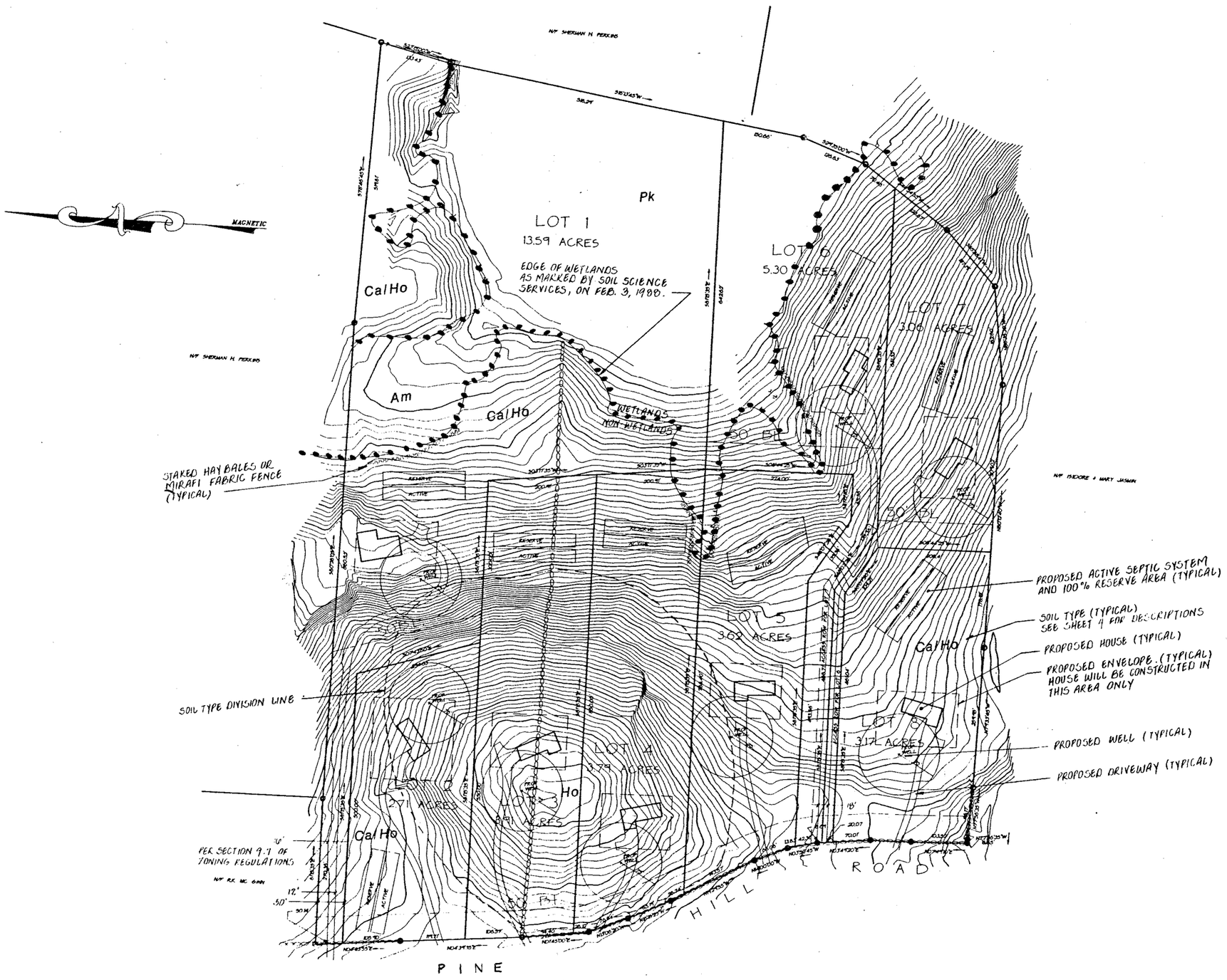


Figure 2



Am - ALLUVIAL LAND *
Ca - CHARLTON FINE SANDY LOAM
Ho - HOLLIS ROCKY FINE SANDY LOAM
Pk - PEAT AND MUCK *

* WETLAND SOIL

WETLAND BOUNDARY

STONEBROOK SUBDIVISION

COLEBROOK, CONNECTICUT

PROPOSED SECTION 1

King's Mark Environmental Review Team

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STONEBROOK SUBDIVISION

COLEBROOK, CONNECTICUT

PROPOSED SECTION 2

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Figure 3

WETLAND BOUNDARY

Ca - CHARLTON FINE SANDY LOAM
Ho - HOLLIS ROCKY FINE SANDY LOAM
Pb - PAXTON FINE SANDY LOAM
Pk - PEAT AND MUCK *
Wx - WOODBRIDGE FINE SANDY LOAM

* WETLAND SOIL

N/F WALTER + EMMERETTE JESPERSEN

N/F SIDNEY E. LAZARD

N/F LILLIAN K. JASMIN

N/F FLOYD C. HART

N/F JOHN R. TWEEDY, TRUSTEE

EDGE OF WETLANDS AS MARKED BY SOIL SCIENCE SERVICES ON FEB. 3, 1988

WETLANDS
NON-WETLANDS

OPEN SPACE

LOT 1

LOT 2

LOT 3

LOT 4

LOT 5

LOT 6

LOT 7

LOT 8

LOT 9

LOT 10

LOT 11

LOT 12

LAND TO BE RETAINED BY FREDERICK STARR & WILDMAN

23.00 ACRES

INTERMITTENT STREAM

PROPOSED CULVERT (TYP.)

PROPOSED ACTIVE SEPTIC SYSTEM AND 100% RESERVE AREA (TYPICAL)

PHELPS

ROAD

Pk

Wx

Ca Ho

Pb

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

(1) assessment of the geological characteristics of the site, including geological development limitations and opportunities for roads and houses;

(2) assessment of the hydrological characteristics of the site, including wetland hydrology and stormwater drainage;

(3) determination of the suitability of existing soils to support the proposed development;

(4) discussion of soil erosion and sedimentation concerns;

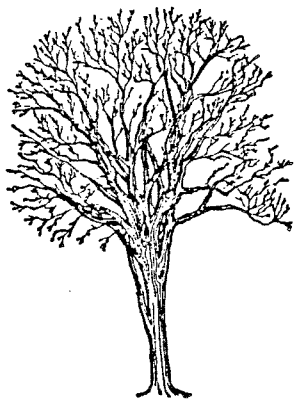
(5) assessment of the impact of the development on the wetlands and rivers;

(6) assessment of the impact of the development on the wildlife/habitat;

(7) assessment of planning and land use issues, including open space and recreational planning, and;

(8) discussion of the suitability of the site to support on-site septic and water facilities.

PHYSICAL CHARACTERISTICS



SETTING, LAND-USE AND TOPOGRAPHY

The proposed subdivision site is located in west central Colebrook. Section 1, about 40 acres in size, lies on the east side of Pine Hill Road. The applicant wishes to subdivide the parcel into 8 building lots, all of which are greater than two acres in size and have frontage on the gravel-based road. The site is located on a rock cored hill that is entirely wooded. The front part of the site is gently sloping, but it slopes moderately then steeply eastward to a large wetland area. Topographic conditions in Section 1 are controlled mainly by the underlying bedrock. Several seasonal drainageways, that act as conduits for surface runoff, occur on the site. Water is ultimately routed to the wetland which transports it to Loon Brook.

Maximum and minimum elevations on the site are about 1,360 feet above mean sea level and 1,240 feet above mean sea level, respectively (see Figure 4).

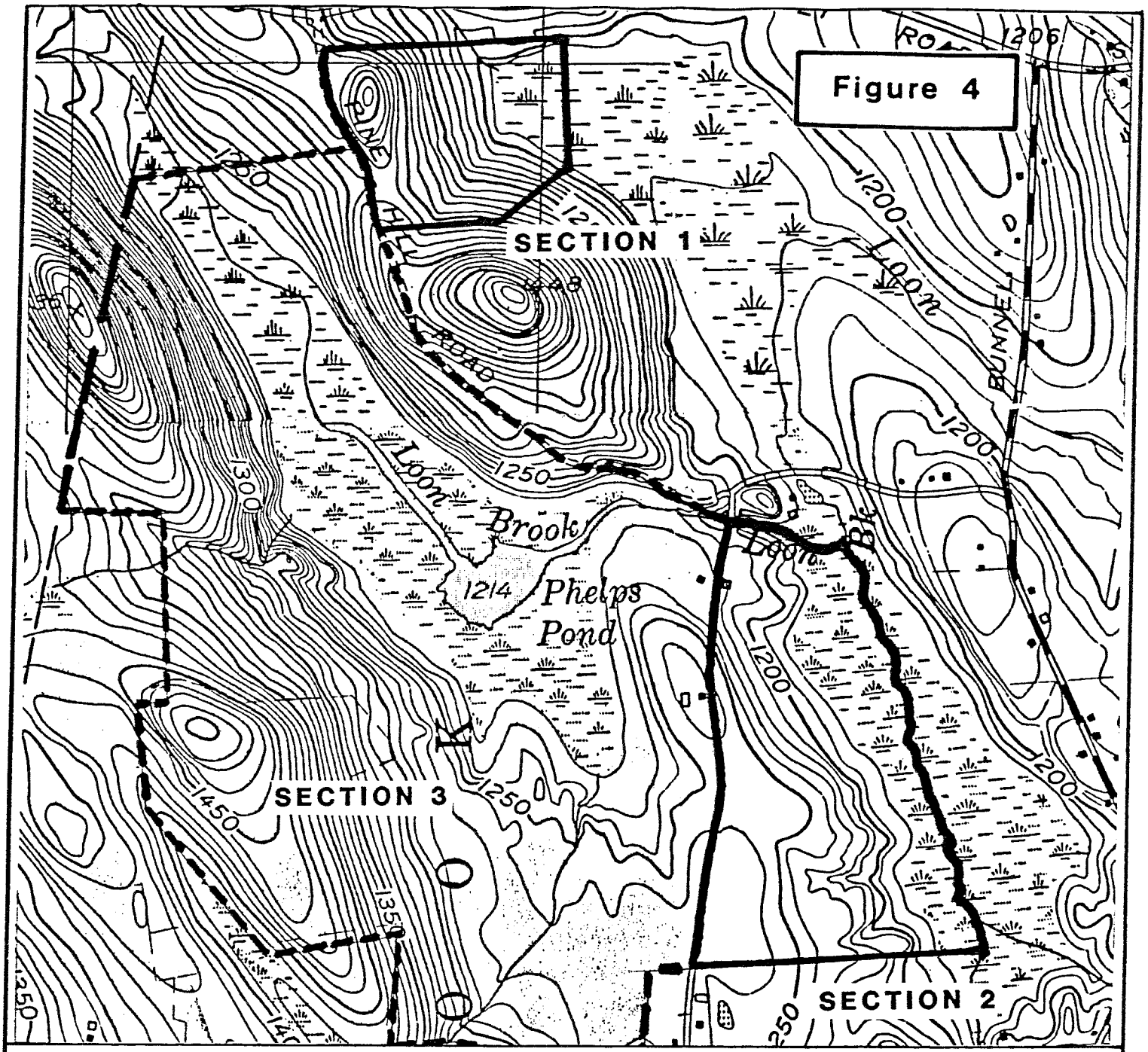
Section 2, about 89 acres in size, lies on the east side of Phelps Road and is about 1/2 mile southeast of Section 1. It flanks the east side of a streamlined hill (drumlin) that slopes to a large wetland area. Slopes range between flat and moderate. Steepest areas bisect the central parts in a north-south direction. Maximum and minimum elevations on the site are about 1,260 feet above mean sea level and 1,180 feet above mean sea level, respectively (see Figure 4). Several seasonal drainageways that route runoff to the wetland area are visible in Section 2. Two moderately sized hay fields occupy the western half of Section 2. The remainder of the site is largely wooded. All 12 lots proposed for Section 2 will be accessed from Phelps Road.

GEOLOGY

Section 1 is encompassed by the South Sandisfield topographic quadrangle. A combined bedrock and surficial geologic map (GQ-1519, by David Harwood) for the quadrangle has been published by the U.S. Geological Survey. Section 2 lies within the Winstead topographic quadrangle. Only the surficial geologic map (GQ-871, by Charles Warren) has been published for the quadrangle by U.S. Geological Survey. Preliminary bedrock geologic information is available for the quadrangle at DEP's Natural Resources Center.

Both Sections 1 and 2 are covered entirely by glacial sediments called till (see Figure 5). Till consists of a poorly sorted mixture of rock fragments and particles deposited directly by glacier ice. Rock fragments and particles found in the soil are derived from the local bedrock. According to soils mapping data, the till covering Section 1 is sandy and loose to moderately loose. It is shallow (probably 5 feet or less) in the western and southern parts, but probably becomes deeper (10 feet or less) on the remainder of the site. A compact zone which impedes the downward movement of groundwater about 24" below ground surface may be encountered in the till soils in the northern parts of Section 1. The boundary for regulated inland wetland soils has been delineated in the eastern limits of Section 1. Regulated soils also parallel several drainageways on the site.

The majority of till soils in Section 2 are relatively deep and largely silty and compact. Silty compact soils commonly result in seasonally elevated water tables, soil mottling and slow percolation rates, which can be a hindrance to septic system installation. Deep test hole information supplied to Team members confirm the subsurface conditions. A sandy and more loosely compacted till may be encountered at the northern end of Section 2. Based on



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TOPOGRAPHY

King's Mark Environmental Review Team

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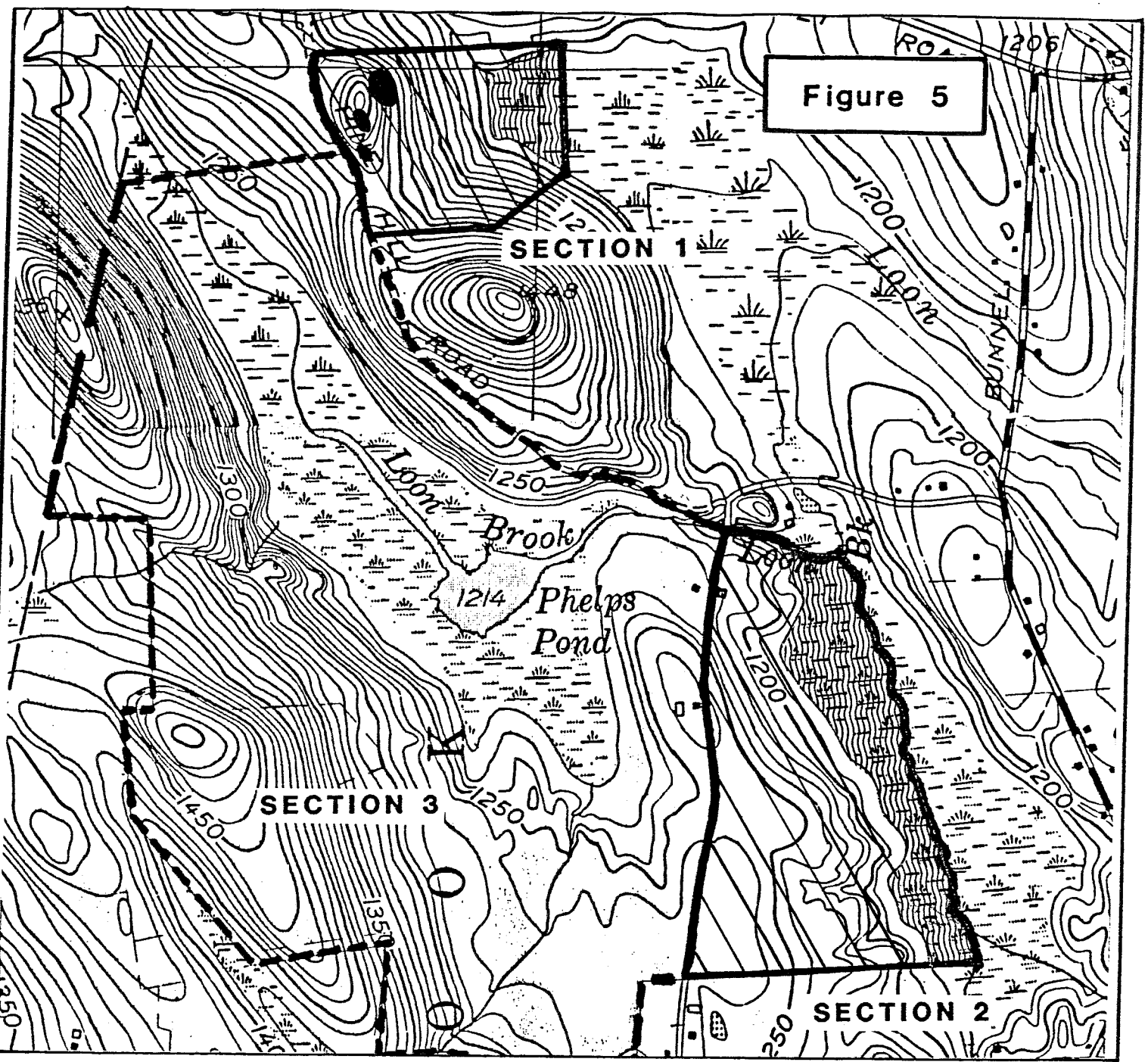

STONEBROOK SUBDIVISION

COLEBROOK, CONNECTICUT

SURFICIAL GEOLOGY

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deep test hole data, it appears that the bedrock surface was encountered on some lots in Section 2. Regulated inland wetland soils have been mapped along the eastern limits of Section 1 and also parallel several drainage ways on the site.

The bedrock core of Section 1 has been identified as a dark gray, rusty weathering schist and gneiss (see Figure 6). A narrow, north-south trending band of garnet rich amphibolite (rock containing high percentages of amphibole minerals, i.e., hornblende, plagioclase, etc.) and granite rock traverses the western parts. The bedrock underlying Section 2 consists of a gray, medium-grained, well layered gneiss.

The terms schist, amphibolites and gneiss refer to the textural characteristics of the rock. All three rock types are metamorphic and have long, very complex histories. They are probably the oldest rocks (Precambrian geologic period) found in Connecticut. As a result they have been subjected to great heat and pressure (metamorphism) of mountain building periods. The rocks have greatly changed since their deposition as mud, silt, sand and volcanic material. The granite in Section 1 intruded the older surrounding rock as molten material. It is light gray to pink, medium-grained rock composed of the minerals quartz, feldspar, micas, sphene, apatite, magnetite and zircon. The amphibolites are presumed to have a volcanic origin.

The underlying bedrock is the principal source of water to residences throughout Colebrook. It will also be the source of domestic water to proposed homes in the subdivision.

GEOLOGIC DEVELOPMENT CONCERNS

In terms of the proposed subdivision (Sections 1 and 2), the major geologic limitations which warrant close examination include the following:

1) Lots which have shallow to bedrock conditions, generally 7 feet or less (Lots 2, 3, 4, 5 and 8 in Section 1).

2) Areas of moderate to steep slopes (mostly all of Section 1 and the central parts of Section 2).

3) The presence of till (hardpan) soils which have moderately slow percolation rates and elevated groundwater table. These two conditions result from the silty and more compact soil zone which develops below the rooted and surficial weathered zone.

The geologic limitations will weigh heaviest on the ability to provide adequate subsurface disposal systems serving homes constructed in the proposed subdivision. Based on subsurface data supplied by the applicant's engineer, it seems likely that special engineered design plans will be required on most lots to overcome the geologic limitations. For example, improvements such as curtain drains and/or elevating areas designated for leaching systems with suitable fill material will be required for lots with high groundwater conditions or shallow to bedrock conditions. Sufficient exploratory work is warranted on the lots that are characterized by shallow to bedrock conditions. Ideally, septic system areas should be located in areas where slopes do not exceed 25 percent. Because of severe shallow bedrock conditions on Section 1, Lots 3-4, the leaching areas for the proposed septic systems need to be located 300-400 feet to the east where deeper soils are found. In order to accomplish this, the distribution line needs to traverse shallow soils and very steep terrain. The major concerns with this are: 1) the potential for effluent to freeze in the pipe if not properly covered, and 2) the potential for flooding at the first distribution box due to the expected high velocity of the effluent as it travels down the steep slopes. Close examination by the design engineer is warranted for both of these concerns. Finally, leaching systems for all lots should be kept shallow, relatively large and spread out with the contours to encourage lateral dispersal.

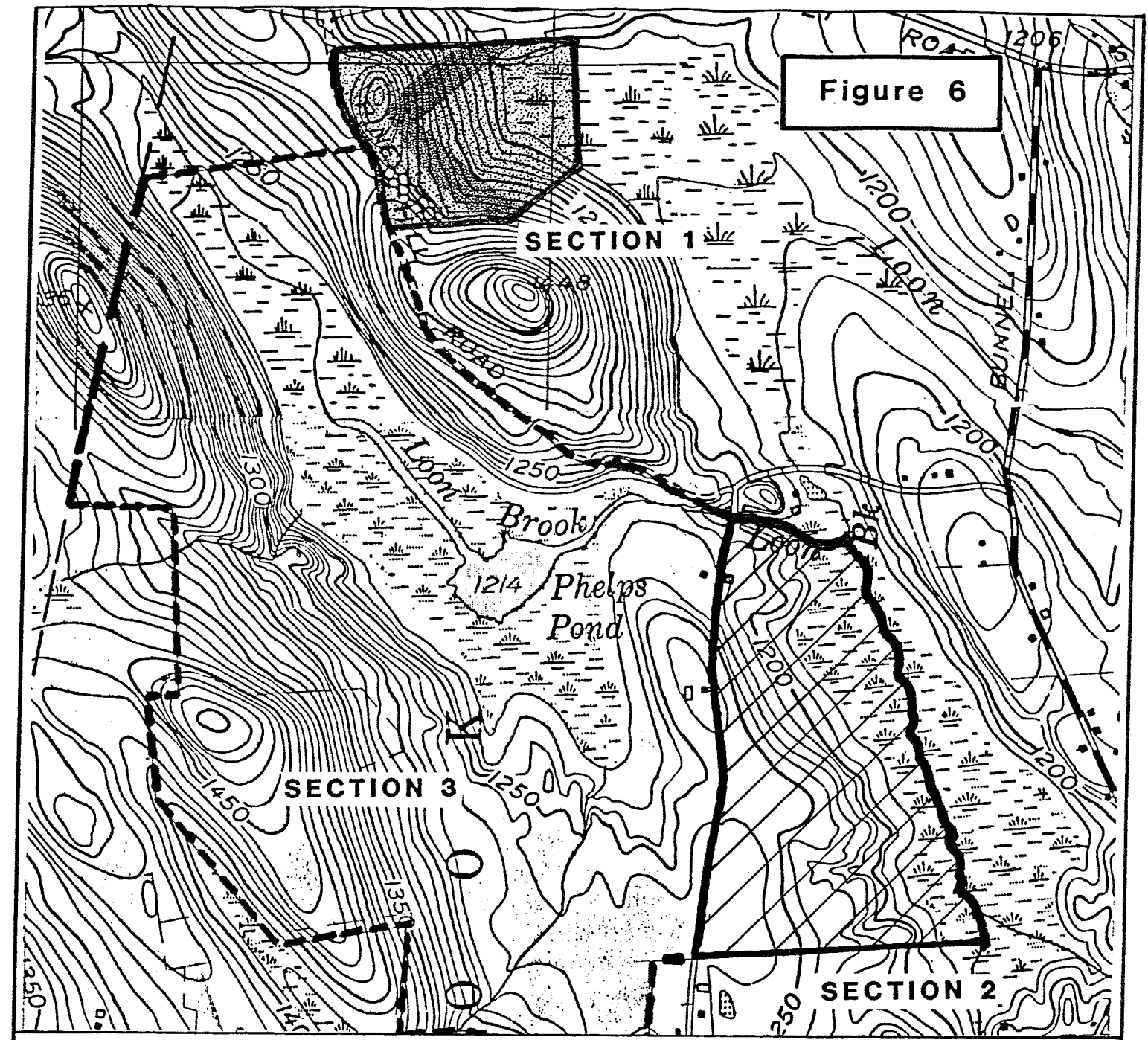
Figure 6
SECTION 1
SECTION 2
SECTION 3
Loon Brook
Phelps Pond
1214
1206
1200
1250
1300
1350
1400
1450
1500
1550
648
ROAD
BOUNDARY
Gray, medium grained, well layered gneiss
Dark gray, rusty weathering schist
Granite (pegmatite)
Garnet rich amphibolite lens
STONEBROOK SUBDIVISION
COLEBROOK, CONNECTICUT
BEDROCK GEOLOGY
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The presence of bedrock at shallow depths, especially in the western limits of Section 1, suggests that blasting will probably be required in order to place driveways, foundations, septic systems and distribution lines. Any blasting that takes place on the site should be done very carefully and under the strict supervision of people experienced with the newest technology in blasting techniques. This will hopefully help to reduce the chance for undue seismic shock and potential damage claims. In this regard, it is also wise to conduct a pre-blast survey of the area. Generally speaking, it is only when blasting is conducted without regard to seismic shock or air-blast impacts that there are problems on surrounding properties.

WATER SUPPLY

Present plans indicate that the proposed house lots for both sections would be served by individual on-site wells. The underlying bedrock will be the likely source of water to the wells. Although not prolific aquifers, the crystalline bedrock beneath the site is generally capable of yielding quantities of water adequate for most domestic uses. A yield of 3-5 gallons per minute is generally desired for residential use. The site lies within the Farmington River Basin, and according to Water Resources Bulletin #29, 70 percent of the metamorphic bedrock wells (331 surveyed) had yields of 3 gallons per minute or more.

The presence of a fault aligned with Loon Brook suggests that at least the upper few hundred feet of the bedrock surface in the area may be fractured and weathered. Fractured and weathered zones in the bedrock provide storage for groundwater which in turn should be available for future homes in the subdivision.

In general, private wells should be located on the high side of lots with proper separating distance from on-site sewage disposal systems and other potential sources of pollution, particularly buried fuel storage tanks. Wells must also be properly separated from water impoundments, watercourses and drains and be protected from surface runoff and erosion problems.

Properly constructed drilled wells will generally afford the greatest level of protection against possible sources of pollution. Also, drilled wells usually allow for more flexibility in actual site placement. All wells are to be constructed by persons who are state licensed for drilled wells. The town sanitarian needs to inspect the proposed well sites and issue a permit for each well in the subdivision. The sanitarian must ensure that all sections of the State Public Health Code, State Well Drilling Board Rules and Regulations and local ordinances have been followed. Provided this is done, there should be little chance of water quality or quantity problems, except perhaps those that occur naturally.

The natural quality of groundwater in this area should be good. However, there may be a chance that elevated iron and manganese levels could affect well water quality, especially in Section 1. As a result, it may be necessary to install an appropriate water treatment system.

HYDROLOGY

Sections 1 and 2 lie entirely within the Loon Brook drainage area. At its point of intersection with Route 183 near Colebrook Center, the brook drains an area of 7.33 square miles or 4,691 acres. Sections 1 and 2 combined represent about 3 percent of the drainage area. The entire 520 acres represents about 11

percent of the drainage. Surface runoff both sections flows generally eastward to an expansive wetland area. It seems likely that the natural detention capabilities of the wetland would be very high.

Groundwater in the area is classified by the DEP as GA, which means that it is suitable for private drinking water supplies without treatment. As a result, homeowners should be very careful as to the disposal of certain household chemicals to subsurface sewage disposal systems. Certain chemicals/substances could deteriorate groundwater quality in the area.

Development of the site for residential use would be expected to lead to some increases in the amount of runoff shed from the parcel. The amount of increases will depend upon the extent of development, the impervious surfaces created and the amount of vegetation removed or preserved. In view of the low densities currently proposed and no need for interior road systems, it seems likely that increases would be low. Also, the natural detention capabilities of the wetlands to the east of both Sections 1 and 2 will help to alleviate any potential for flooding problems.

The other concern regarding increased runoff is the chance for streambank erosion and gulleying. Connecticut's Soil Erosion and Sediment Control Act (P.A. number 83-388) requires that the applicant devise a thorough erosion sediment control plan. Because of the moderate and steep slopes present in Sections 1 and 2 and silty soils, the concern for potential erosion becomes a significant one. A well managed activity will need to take all necessary measures to contain and filter disturbed water so that it does not cause environmental damage on and off the site. The best solution for erosion and sediment control is to keep disturbed areas to a minimum.

SOIL RESOURCES

Soil Descriptions

The soils identified within the proposed subdivision include: Alluvial land, Charlton fine sandy loam, Hollis rocky fine sandy loam, Paxton fine sandy loam, Peat and Muck, and Woodbridge fine sandy loam (see Figures 2 and 3). Soil characteristics and soil limitations, noted in the following descriptions, are summarized in Appendix A, Tables 1 and 2, respectively.

Alluvial Land: This soil, identified as Am, consists of recent alluvium so variable in texture and drainage that classifying the material is not practical at the map scale used within the Soil Survey, Litchfield County, Connecticut. Within short distances the texture ranges from silt loam to coarse sand. Some areas are well-drained or moderately well-drained; but others, cut by old stream channels, are poorly drained or very poorly drained. This land occurs in scattered areas along rivers and other streams in the county, and it is subject to frequent flooding.

The degree of limitation for development is very unfavorable, with wetness and flooding being the primary types of limitations.

Charlton Fine Sandy Loam: This soil, identified as Ca, is deep, well drained, nearly level or undulating to hilly, that developed in friable to firm glacial till. Permeability is moderate to moderately rapid in the surface layer and subsoil.

Slopes range from 3 to 35 percent and runoff is a hazard; unprotected areas are subject to sheet and rill erosion.

The degree of limitations for development range from favorable to not favorable, with slope being the primary type of limitation.

Hollis Rocky Fine Sandy Loam: This soil, identified as Ho, is well drained or somewhat excessively drained, gently sloping to steep. Permeability is moderate or moderately rapid; the available moisture capacity is moderate. Slopes range from 3 to 15 percent.

The degree of limitation for development is very unfavorable, with a shallow depth to bedrock being the primary type of limitation.

Paxton Fine Sandy Loam: This soil, identified as Pb, is well-drained and contains a compact layer, or hardpan, at a depth of about 2 feet. This soil type commonly occupies smoothly rounded drumlins or drumloidal hills that were elongated in a north-south direction by moving glaciers. Permeability is moderate in the surface layer and subsoil but slow or very slow in the substratum (>2 ft.); the available moisture capacity is high. Slopes range from 3 to 15 percent and erosion is a hazard on the steeper slopes.

The degree of limitations for development range from favorable to not favorable, with wetness, a dense layer (hardpan) and slow percolation being the primary types of limitations.

Peat and Muck: This soil, identified as Pk, consist of organic materials deposited in bogs and swamps, where the water table is at or near the surface most of the year. These materials are the decomposed remains of plants, chiefly mosses, sedges, cattails, and the roots, leaves, and stems of woody vegetation, all laid down in permanent bodies of water. Deposits range from about 3 feet to more than 25 feet in depth.

The degree of limitations for development is very unfavorable, with ponding (standing water), slow percolation and subsiding (settling) being the primary types of limitations.

Woodbridge Fine Sandy Loam: This soil, identified as Wx, is moderately well drained and also contains a compact layer at a depth of about 2 feet. Permeability is moderate in the surface layer and subsoil but is slow or very

slow in the substratum. The available moisture capacity is moderate. Slopes range from 3 to 15 percent and erosion is a hazard on the steeper slopes.

The degree of limitations for development range from not favorable to very unfavorable, with wetness, slow percolation and frost action (heaving) being the primary types of limitations.

Soil Limitations

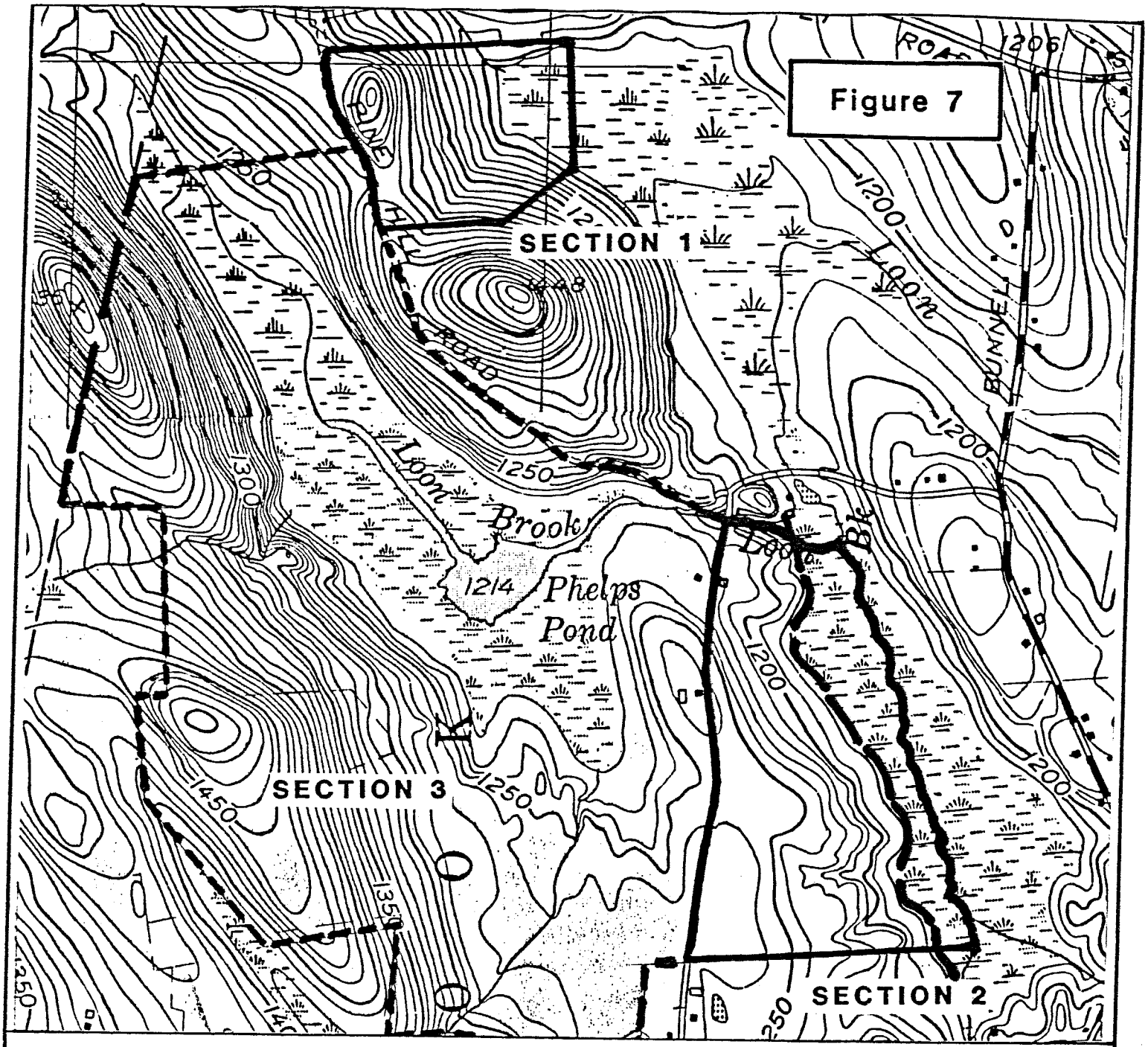
The soil limitations which are identified do not preclude development. However, they do however indicate the need for more precise planning and careful review of proposed project components. In some cases, the costs may greatly exceed the benefits.

Septic systems, and in particular septic tank absorption fields, may require precise engineering plans in order to function properly within the proposed locations. This is particularly important in areas with slopes of 15 percent or greater, percolation rates exceeding 30 minutes per inch, where the seasonal high water table is less than 3 feet below the soil surface and where depth to bedrock is less than 72 inches. Periodic field inspection and documentation during construction may be necessary to insure compliance and project success.

Phasing construction activities, especially on steep slopes, in conjunction with properly installed and maintained erosion and sediment controls, will minimize soil loss or degradation of the soil resources. This recommendation is particularly important for activities within Section 1.

Flood Boundary - Loon Brook

The eastern boundary of Section 2 is within "Zone A" of the 100 year flood boundary of Loon Brook (see Figure 7). This area extends from the centerline of the brook, west to the approximate wetlands limit of this section. The base flood elevations and flood hazard factors for this zone have not been determined.



100 YEAR FLOOD BOUNDARY

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FLOOD BOUNDARY

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An area of particular concern addresses the components of, but not limited to, the location, design and construction of septic systems, wells and house sites, associated with lots 1, 6, 7, 10 and 11. Again, thorough planning must be achieved to insure the success of the structure and function of these components.

The 100-year flood boundary does not occur within Section 1 of this proposed subdivision.

Erosion and Sediment Control

The erosion and sediment (E&S) control plan associated with the proposed subdivision is basically adequate. However, the following additional comments and recommendations should be considered:

1) Silt fencing (synthetic filter barrier) is recommended over hay bales for providing longer lasting and maximum E&S control protection to the wetlands. Haybales last approximately 60 days before needing replacing; silt fencing will last between 1 and 2 years. This recommendation is extremely important in association with, but not limited to, driveway construction and wetland crossing activities, and septic system construction adjacent to wetlands.

2) Provide the following information directly onto the plans:

   a. Recommended seeding dates for establishing permanent vegetative cover: April 15 through June 15 and August 15 through September 15;

   b. Location(s) of stockpiled topsoil;

   c. Design information for road crossings through wetlands; and

   d. Provide construction entrances at the beginning of driveways, design information to be included.

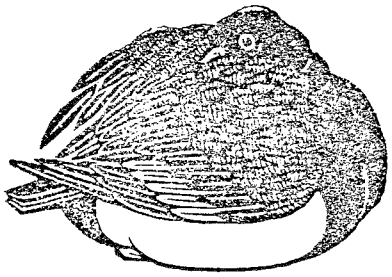
3) The key to successful E&S control is proper installation and maintenance. This is extremely important when considering the existing and potential erosion hazards associated with steep slopes and wetlands protection. During construction, if E&S damage is noticed, positive adjustments must be made in order to provide maximum protection to the soil resources. As individual plans for home sites are developed, thorough E&S control plans must also be developed and carefully reviewed for adequacy.

Summary

The proposed activities associated with Stonebrook Subdivision should not adversely impact the soil resources, provided the management recommendations are considered and incorporated within the planning process and compliance is achieved on the ground.

The soil erosion and sediment control plan is basically adequate. However, construction activities on steep slopes or adjacent to wetlands must be carefully monitored and adjustments made, if necessary, to protect the resources from erosion or sediment damage.

BIOLOGICAL RESOURCES



WETLAND CONSIDERATIONS

Section 1 - Site Description

Section 1 is located on the east side of Pine Hill Road approximately 250 feet south of Shantly Road. Included on this property are approximately 9.5 acres of wetlands. The wetland system consists of the very poorly drained peat and muck (Pk) soils, with the Alluvial land (Am) soil designation along the northern-most stream that drains into the wetland. The topography consists of a steeply sloping knoll located on the northwestern corner of the property which sharply levels off into the wetlands to the east. The wetlands extend westward up the slope as fingers along three watercourses which drain into the main system.

The wetlands on Section 1 of the property are classified as follows by the National Wetlands Inventory (see Figure 8):

1) PFO4 - Palustrine, Forested, Needle-leaved Evergreen.

The dominant canopy species in this forested swamp is hemlock (Tsuga canadensis), with red maple (Acer rubrum) saplings dominating the understory. Various species of mosses, ferns and sedges were the observed groundcover. Standing water was present at the time of the inspection. The wetland itself was impenetrable, due to thick ground vegetation as well as previously deposited debris from an old logging operation.

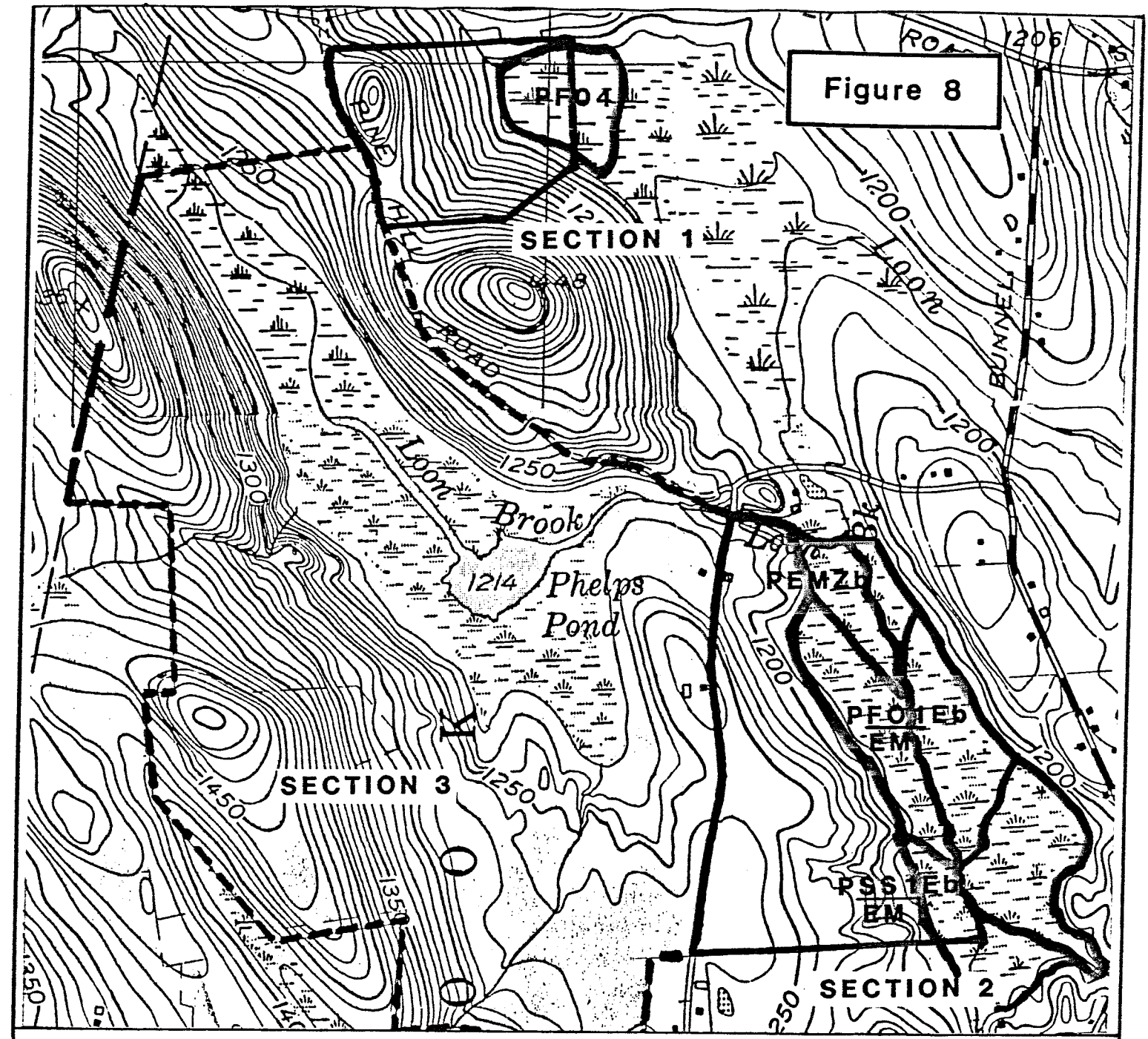
Wetland Values: The wetland system in Section 1 of this project in association with the adjacent uplands and watercourses are considered to be of high quality with respect to wildlife habitat. The dense understory vegetation together with extensive ground and canopy cover provides many ecological niches which can be utilized by a diverse array of both plant and animal species for feeding, shelter, cover and reproductive purposes.

The wetlands are extremely important in maintaining the hydrologic stability of this area. They serve to collect and slowly dissipate large quantities of stormwater runoff from the adjacent uplands. The wetland bordering the stream that enters the property from the north is important, as this stream is subject to periodic flooding. This wetland corridor functions to temporarily store the flood waters and to slow the velocity of flow. These functions will become increasingly important upon the construction of impervious surfaces that result in increased surface runoff. This system also serves to filter sediment originating in the uplands before it enters the watercourses that flow out of the wetland. Due to the steepness of the adjacent slope and the nature of the soils, preservation of this wetland in its undisturbed state is critical to maintaining its functions in flood control, stormwater drainage and sediment filtration.

Wetland Impacts: The development, as proposed, involves no direct disturbance to the wetland. However, excavation of the uplands may potentially result in adverse impacts to the wetland due to increased sedimentation and excess amounts of debris finding their way to the wetland. The functional values that this system provides could be greatly diminished if precautions are not taken to ensure that this does not occur. The proper installation and continued maintenance of sediment and erosion control measures would mitigate these potential impacts along with prohibiting the dumping of debris, (i.e. branches, stumps and logs) into the wetland. It is recommended that silt fencing be installed along the wetland border and around any stockpiled materials to prohibit excess sediment from entering the wetland.

Section 2 - Site Description

Section 2 of this project is located north of Route 182, on the eastern border of Phelps Road. This site contains approximately 48 acres of wetlands, which constitutes over half of the area on the property. The topography



PF04 - PALUSTRINE, FORESTED, NEEDLE-LEAVED EVERGREEN

PEMZb - PALUSTRINE, EMERGENT, INTERMITTENTLY EXPOSED/PERMANENT

$P\frac{FO1}{EM}Eb$ - PALUSTRINE, FORESTED, BROAD-LEAVED DECIDUOUS, EMERGENT, SEASONALLY SATURATED

$P\frac{SS1}{EM}Eb$ - PALUSTRINE, SCRUB/SHRUB, BROAD-LEAVED DECIDUOUS, EMERGENT, SEASONALLY SATURATED

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NATIONAL WETLAND INVENTORY

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systems may be forced to enter the wetland causing unnecessary sedimentation. It is recommended that the Commission evaluate all possible alternatives to this proposal which include the following:

1) A reduction of the number of lots which would reduce the number of crossings required to access the property, and/or

2) Reducing the number of crossings from four to two. One crossing to access Lots 1, 2 and 3 and one combined crossing to provide access to lots 5, 6, 7 and 8.

Again, the applicant should also implement proper sediment and erosion control measures to reduce the potential for excess amounts of sediment accumulation in the wetlands and watercourses.

Conclusion

The wetlands on the property are part of an extensive wetland system. Given the large area that this system encompasses and the network of interrelated streams and other watercourses included in the system, these wetlands are considered to be an integral component in maintaining the ecological integrity of the land. The Commission has a responsibility to protect the natural wetland resources in the Town of Colebrook. The proposed development appears to pose no direct threat to the wetlands on the property. However, the potential for secondary disturbances to occur, resulting from excavation and grading activities, is enough to raise concerns. The Commission should evaluate the alternatives enumerated above as well as all other feasible and prudent considerations.

WILDLIFE CONSIDERATIONS

Description of Area/Habitat

The area proposed for development is divided into three sections and contains 520 acres in total. Two areas or sections, Section 1 and Section 2,

are proposed for development at this time. The northwest section, Section 1, is separated from the eastern section, Section 2, by a large 391 acre section, Section 3. Thus the two areas currently proposed for development are not contiguous, but would be if and when Section 3 were developed. All three sections contain portions of the wetland system associated with Loon Brook.

Section 1: Section 1 is approximately 40 acres in size. It is characterized by steep forested slopes which decline towards a wetland area. The mixed hardwood forest covering the site contains oak, hickory, beech, birch and maple along with some hemlock. The wetland found in this area contains elm, red maple, hemlock and a variety of shrubs and herbaceous plants. This is the upper portion of the same wetland system also found in Section 2.

Generally, the greater the habitat diversity and degree of interspersion of different habitat types, the greater the variety of wildlife there will be using an area. Section 1, while not highly diverse, does offer an area of habitat to species requiring forested habitat. Also, it contains a portion of the large wetland area associated with Loon Brook, which helps increase its value to wildlife. Overall, the Loon Brook wetland area, because of its diversity is an important area of wildlife habitat.

This forested area of habitat with its adjacent wetland area in Section 1, would provide habitat for a variety of species such as deer, turkey, squirrels and birds such as chickadees and woodpeckers.

Section 2: Section 2 is approximately 89 acres in size and contains open fields, mixed hardwood forest and a fairly large portion of the wetland area of Loon Brook. The mixed hardwood forest contains oaks, maple, hickory, beech, cherry and some hemlock. In addition to providing cover, nesting and roosting places, the oak and beech found there (and in Section 1) provide a valuable food source in the form of mast.

The snag trees (dead trees) on the property provide insects for a variety of wildlife such as woodpeckers, chickadees and other insect eating birds. The den trees (trees with holes) found scattered throughout the property provide cavities for nesting owls, swallows, etc. The cavities also provide denning sites for racoons, etc.

The open hay field areas in Section 2 provide early successional stage habitat, an important type of habitat because it can provide food in the form of seeds and insects. Insect production is higher in open areas and is the reason these areas are important to birds. In addition to providing feeding areas for birds, open areas also provide areas for nesting of some species. These open fields also provide habitat for small mammals. Because of this, birds of prey often utilize these areas to hunt.

The wetland area in Section 2 is very diverse. It contains open water areas, aquatic plants and various trees and shrubs around the perimeter of the wetland. This wetland, because of its vegetative diversity and large size, offers excellent wetland habitat for a variety of species, such as ducks, wading birds, songbirds, deer, turkey and a variety of aquatic mammals such as muskrats, beaver and otter. It also provides habitat for a variety of reptiles and amphibians.

The wetland area provides a portion of the requirements of some species (such as deer which would utilize the adjacent forest and fields as well), while for others (such as the muskrat) it provides for all their requirements. Wetlands offer cover and nesting areas, along with a variety of food sources.

Section 1 offers forested habitat to a variety of species, and its value as wildlife habitat is increased because it includes part of the diverse wetland area of Loon Brook. Section 2, which offers open fields, mixed hardwood forest and diverse wetlands, currently is good to excellent wildlife habitat. The

large diverse wetlands in Section 2 serve to enhance the area for wildlife in general. Both Sections 1 and 2 are made more valuable to certain wildlife species because there is little development around them, wildlife populations are not restricted in their movements and there is little disturbance from human activity.

Wildlife Resources/Recommendations

As with any development the impact on wildlife habitat in general will be negative and long lasting. A sizeable 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.

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 racoons.

The design of this development which contains medium sized lots (approximately 2 to 5 acres) will probably increase the negative impacts to wildlife habitat.

When considering the impacts which the development of an area will have on wildlife habitat, many factors should be considered, including acreage. Section 1 and Section 2 together will impact 129 acres. Section 3, if developed at a later date, will impact an additional 391 acres. Altogether a total of 520 acres of land containing an extensive and valuable wetland system will be affected by development.

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 as open space areas. 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.

Wetland areas are limited in quantity in the state and continue to dwindle on an almost daily basis, another important factor in considering their preservation. Their value increases as the quantity of the resource diminishes. A buffer of at least 100 feet is recommended around wetlands to preserve their value and use by wildlife.

Open Space

Whatever type or combination of types of areas are set aside, setting aside an "island of open space" surrounded by development is the least desirable for wildlife. The area should have natural travel pathways for wildlife (such as streams, valleys and 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. 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 should 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 producing trees (i.e. oak, hickory, beech). A minimum of five oaks per acre, 14 inches dbh 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, 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 which produce fruit which persists through the winter (winterberry, grape). See Appendix B for a list of shrub and tree species that can be encouraged and/or planted to benefit wildlife.

6) Nesting sites can be provided for a great variety of birds with placement of artificial nest boxes.

Large houselots and implementation of the suggested guidelines may help to minimize the adverse impacts to local wildlife populations. Implementation of backyard wildlife habitat management practices should be encouraged. Such activities include providing food, water, cover and nesting areas.

If large houselots (10 or more acres) cannot be provided for, cluster housing should be considered. By clustering the homes together, less land is disturbed and built on, and therefore more remains to be utilized for wildlife habitat.

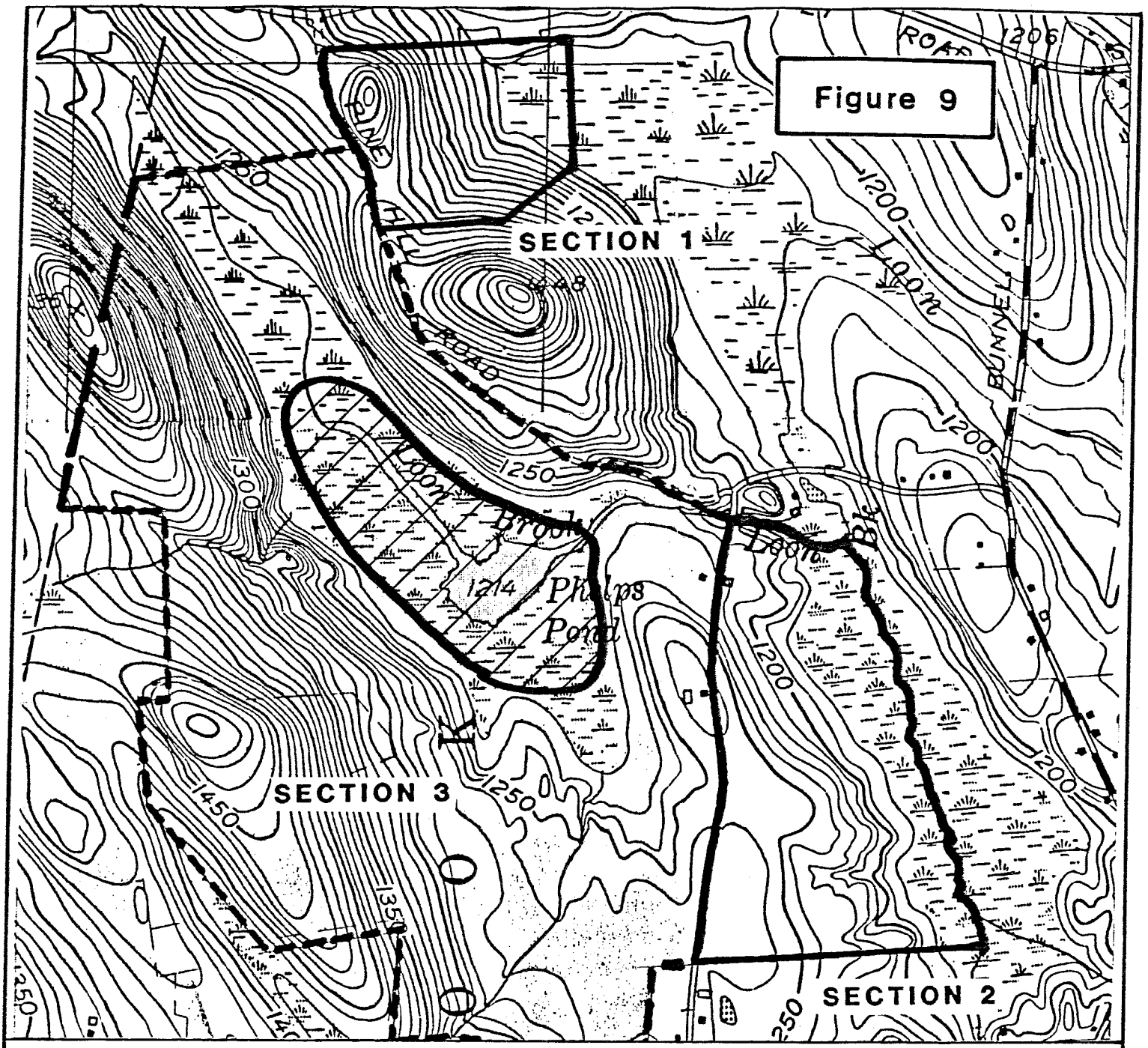
THREATENED AND ENDANGERED PLANT AND ANIMAL SPECIES

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. The Natural Diversity Database contains the most current biological data concerning endangered or threatened plant or animal species. On-going research continues to locate additional populations of species or locations of habitats of concern as well as existing data.

NATURAL AREA INVENTORY SITE

Phelps Pond Bog, located in Section 3 of the Stonebrook subdivision in Colebrook, is a Natural Area Inventory site (see Figure 9). The area is described as a "dense mat of shrubs with standing dead trees." The surrounding upland slopes are forested in beech, pine and oak. Twenty three feet of peat have been recorded in the center of the bog. Sections 1 and 2 are in close proximity to the area.

In 1972 the Connecticut Forest and Park Association, Inc. prepared a Natural Area Inventory which included 459 sites. These were nominated as significant sites for one or more of the following attributes: (1) geologic; (2) hydrologic; (3) biologic; (4) archaeologic; (5) cultural; (6) aesthetic; and (7) research/educational. A site receives no legal protection by being included on the Natural Area Inventory list.



NATURAL AREA INVENTORY SITE

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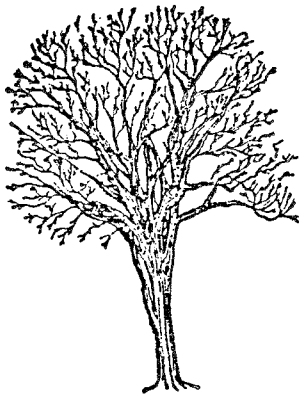
LAND USE AND PLANNING CONSIDERATIONS



and sewage disposal on a permanent basis, which are inconsistent with open rural character or conservation values of adjacent areas and which are more appropriately located in Rural Community Centers." The large wetland area associated with Loon Brook is classified as a preservation area according to the State Plan. The state action strategy for preservation areas is to "foster the identification of significant resource...areas of statewide significance and advocate their protection by public and quasi-public agencies in their planning and investment decisions." The proposed project appears to be consistent with the goals and objectives articulated in the State Plan for this area of Colebrook.

The Litchfield Hills Council of Elected Officials is the official regional planning organization for the Litchfield Hills Region which includes the Town of Colebrook. The LHCEO is now in the process of considering the adoption of a preliminary housing policy which, among other objectives, promotes the provision of open space with residential development, supports housing development that accommodates natural environmental limitations and encourages innovative site planning. The proposed project reflects each of these objectives and is compatible with the preliminary housing policy now being considered by LHCEO.

The Town of Colebrook does not have a Town Plan of Development. However, the proposed project is consistent with the comprehensive plan of the town as expressed through its zoning regulations.

To conclude, the proposed project appears to be consistent with State, regional and local plans and policies.

Traffic Considerations

Phelps Road is an improved town road in good condition and should adequately serve the 12 lots proposed along this road. Pine Hill Road is an

unimproved local road and will require upgrading to service the 8 lots proposed off this road. According to the First Selectman, improvements to Pine Hill Road will be made by the town as necessary to provide satisfactory service to any new lots created off Pine Hill Road.

Based upon the frequently used standard of 10 vehicular trips per day for single family detached dwelling units, the combined 20 lot subdivision can be expected to add 200 vehicular trips to the surrounding roadways on an average week day. For comparison, the average daily traffic recorded by ConnDOT in 1985 along Route 182A south of the site was also 200 trips.

Design Considerations

Based on the field investigation and a review of the proposed restrictions on use of the site distributed by the applicant, the following comments are offered for consideration:

1) Protection of the meadows off Phelps Road by restricting construction of buildings within the meadows is an excellent example of creative land planning to protect rural character. Since deed restrictions do not offer permanent protection of a resource, the applicant may wish to consider developing a conservation easement for protection of the meadows. An easement would function essentially as a property deed restriction, but would provide protection in perpetuity. The easement could be given to the Colebrook Land Conservancy which has expressed interest in accepting title to the open space proposed under the project. If there is interest in maintaining the meadows for active farm use, the conservation easement might stipulate that only uses compatible with active farm use be permitted. Use of the meadow for farming could otherwise be precluded if, for example, a resident wanted to fence in a portion of the meadow to keep horses.

2) The provision to not disturb the proposed open space "in any way" including the cutting of trees may be overly restrictive. Potential exists for use of the open space area as a passive recreation area for hiking, bird watching and to learn about nature. The proposed restriction would prohibit the construction of hiking trails, wood duck boxes, a boardwalk into the wetlands or other facilities which could serve to enhance the use and enjoyment of the area. If the area is to be left forever in a completely undisturbed state, the town may find that keeping the proposed open space in private ownership under a conservation easement is preferable to the proposed gifting of the land to the local land conservancy. This would keep the property on the tax rolls and free the land conservancy from maintenance responsibilities at the site. However, if the potential for passive

recreational use of the site is provided, then the gifting of the land to the Colebrook Land Conservancy appears to have significant merit. A small (3-4 car) off-street parking area should perhaps be provided off Phelps Road to facilitate access to the open space area.

3) The driveway layout for Section 2 is less than optimal due to the number of curb cuts in close proximity to one another. This presents a potentially unsafe situation where vehicles could conflict with one another in turning movements. A system of shared driveways, private roads or new town roads should be considered to improve the current plan. Shared driveways may be appropriate for Lots 1, 2 and 3, 5 and 6, 7 and 8. If Colebrook's zoning regulations were amended to provide for private dirt roads (e.g. through a special permit process where meaningful open space land was provided as a trade off), a private dirt road might be appropriate to service Lots 5, 6, 7 and 8. Use of a private dirt road might also be appropriate to service Lots 9, 10 and 11. Barring provisions for private dirt roads, consideration should be given to serving Lots 5, 6, 7 and 8 plus 9, 10 and 11 with paved private roads or local roads as provided for under Colebrook's subdivision regulations.

SEPTIC CONSIDERATIONS

Section 1

The area included in this 8 lot subdivision is steeply sloped with little or no soil cover above bedrock in the westerly section which fronts Pine Hill Road. For that reason, most of the sewage disposal systems are placed in deeper soil areas located considerable distances from the proposed dwellings in areas adjacent to but sufficiently separated from identified wetlands. Based upon the review of soil test data provided by the engineer, adequate depths of top soil and fine sandy loam were observed above the compact sandy hardpan. Of all the lots, Lot 3 would be considered most critical due to the observation of ledge rock in 2 test holes approximately 48 and 52 inches below existing grade. It is most probable that the leaching area needs to be shifted further east in order to gain access to the deeper soils identified in test pit #147 adjacent to the east property line. Sewage disposal systems serving both Lots 3 and 4 will be located approximately 300 to 400 feet away from the building

served. The structures have been obviously located for the most desirable view in an area underlain by ledge rock at an extremely shallow depth. Some of the test holes indicate ledge rock is less than 24 inches below existing grade. It is highly probable that the septic tanks will be located in significant quantities of fill and that long effluent sewer lines will be laid directly above the bedrock from the tank to the remotely located leaching areas. Because of this unique situation, both the septic tank and long effluent distribution lines must be constructed in such a manner to exclude sewage leaking into the bedrock. In addition, several cleanouts should be provided between the septic tank and leaching areas.

Soils in each of the proposed primary and reserve leaching areas appear to be well suited for leaching purposes. Each of the 8 lots will require detailed engineering design plans be prepared due to the shallow depth to bedrock and potential for groundwater to be within 3 feet of existing grade. For that reason, it is highly probable that shallow leaching trench systems will be utilized, incorporating groundwater intercepting drains and some quantity of sandy fill material to assure trench bottoms are placed at least 18 inches above the compact glacial till. One other concern with respect to Lot 3 is the location of the stone wall which runs perpendicular to existing contours. In the past, stone walls have been known to intercept and carry subsurface groundwater flows, acting very much as a curtain drain. Fortunately, Lot 3 is wide enough so that the primary and reserve areas could possibly be located north of the wall and not require its disturbance or removal. It is highly probable that additional deep test pits and percolation tests will be performed with respect to individual designs of sewage disposal systems serving the proposed residences.

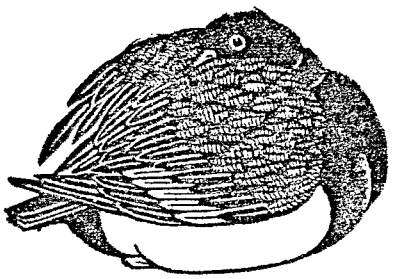
Section 2

The 12 lots included in Section 2 of this residential development differ somewhat from Section 1 in that ledgerock is not a restrictive factor. Many of the residential sites are located in moderately sloped areas in soils identified as suitable for leaching purposes. The major restrictive factor is seasonal high groundwater levels and the proximity of leaching areas to wetlands. In order to allow residential development with minimum view of homes from Phelps Road, the engineer elected to use an effluent pump lift station on Lots 2 and 11. In addition, it is highly probable that the primary and reserve leaching areas will be shifted in order to afford the designated leaching area maximum protection from a groundwater intercepting drain which is normally located upgradient from the primary leaching system. Although many of the designated leaching areas are located adjacent to wetland soils, there are no particular concerns for the possibility or probability of leaching system malfunction or groundwater pollution occurring. Proper design of sewage disposal systems should assure no adverse affects result from sewage disposal application to the soils. Similar to lots in Section 1, it is highly probable that each of the proposed leaching areas will be protected by a groundwater intercepting drain located at least 25 feet upgradient from the leaching areas. In order to minimize the loading on the upper permeable soil layers, designated primary and reserve leaching areas have been spread quite wide parallel with existing contours. It is most likely that the shallow leaching systems will be constructed partially in select fill material with trench bottoms placed 18 inches above the compact till soils noted.

Based upon review of all of the information provided, each of the proposed 12 lots should be considered suitable with respect to minimum Public Health Code requirements for installation of a subsurface sewage disposal system. Due

to the groundwater elevations noted, each of the 12 lots would be classified as an area of special concern and require detailed engineering plans be prepared by a registered professional engineer. It is quite possible that designated leaching areas will be shifted slightly and that additional soil tests will be performed in order to identify the suitability of the final designated primary and reserve leaching areas. The engineering plans should also address the details and technical complexities of pumping effluent to higher leaching areas serving those residences on Lots 2 and 11.

APPENDICES



Appendix A: Soil Tables

TABLE 1 : SOIL CHARACTERISTICS IMPORTANT TO DEVELOPMENT

Soil Symbol	Permeability (in/hr)	K	Corrosivity to Steel Conc.	Flooding	Water Table Depth (ft)	Water Table Kind	High Water Months	Depth to Rock (in)	Frost Action
Am	0.6-6.0	0.2	high high	freq	0-1.5	apparent	Sep-Jun	>60	high
CaB	0.6-6.0	0.24	low high	none	>6.0	-	-	>60	low
CaC	0.6-6.0	0.24	low high	none	>6.0	-	-	>60	low
CaD	0.6-6.0	0.24	low high	none	>6.0	-	-	>60	low
CaE	0.6-6.0	0.24	low high	none	>6.0	-	-	>60	low
HoC	0.6-6.0	0.17	low high	none	>6.0	-	-	10-20	mod
PbB	0.6-2.0	0.24	low mod	none	1.5-2.5	perched	Feb-Apr	>60	mod
PbC	0.6-2.0	0.24	low mod	none	1.5-2.5	perched	Feb-Apr	>60	mod
Pk	0.2-6.0	-0-	high low	none	+.5-1.0	apparent	Sep-Jun	>60	high
WxA	0.6-2.0	0.24	low mod	none	1.5-2.5	perched	Nov-May	>60	high
WxB	0.6-2.0	0.24	low mod	none	1.5-2.5	perched	Nov-May	>60	high
WxC	0.6-2.0	0.24	low mod	none	1.5-2.5	perched	Nov-May	>60	high

- no data available

K = Erodibility Factor
0.10-0.24 - Low Erodibility
0.28-0.37 - Medium Erodibility
0.43-0.64 - High Erodibility

Flooding Classes: None
Occasional
Common
Frequent

TABLE 2: MAJOR SOIL LIMITATIONS FOR DEVELOPMENT

Soil Symbol	Septic System	Excavations	Dwellings	Basements	Commercial	Roads	Lawns	Fill	Ponds
Am	C-7,2,3	C-5,2	C-7,2	C-7,2	C-7,2	C-2,7,8	C-2,7	C-2	C-5
CaB	A	A	A	A	B-9	A	A	A	C-11
CaC	B-9	B-9	B-9	B-9	B-9	B-9	B-9	A	C-11
CaD	C-9	C-9	C-9	C-9	C-9	C-9	C-9	B-9	C-11
CaE	C-9	C-9	C-9	C-9	C-9	C-9	C-9	C-9	C-11
HoC	C-15	C-15	C-15	C-15	C-15	C-15	C-15	C-23,15	C-11
PbB	C-6	B-13,2	B-2	B-2	B-2,9	B-2,8	A	A	C-11
PbC	C-6	B-13,2,9	B-2,9	B-2,9	C-9	B-2,9,8	B-9	A	C-11
Pk	C-12,4,6	C-14,4	C-12,4,10	C-12,4,10	C-12,4,10	C-12,4,8	C-4,14	C-2	C-18
WxA	C-2,6	C-2	B-2	C-2	B-2	C-8	B-2	B-2	C-2
WxB	C-2,6	C-2	B-2	C-2	B-2,9	C-8	B-2	B-2	C-2
WxC	C-2,6	C-2	B-2,9	C-2	C-9	C-8	B-2,9	B-2	C-2

- no data available

Degree of Limitations:

A - Soil properties and site features are generally favorable for indicated use and limitations are easily overcome.
B - Soil properties are not favorable for indicated use and special planning, design or maintenance is needed.
C - Soil properties or site features are so unfavorable to overcome that special design, increases in costs and possibly increased maintenance are required.

Types of Limitations:

1 Seepage	2 Wetness	3 Poor Filter	4 Ponding	5 Banks Cave	6 Slow Perc	7 Flooding
8 Frost Action	9 Slope	10 Low Strength	11 No Water	12 Subsides	13 Dense Layer	14 Humus
15 Shallow Depth	16 Large Stone	17 Small Stone	18 Slow Refill	19 Piping	20 Dam Seepage	21 Erosion
22 Droughty	23 Area Reclaim					

Appendix B: 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.