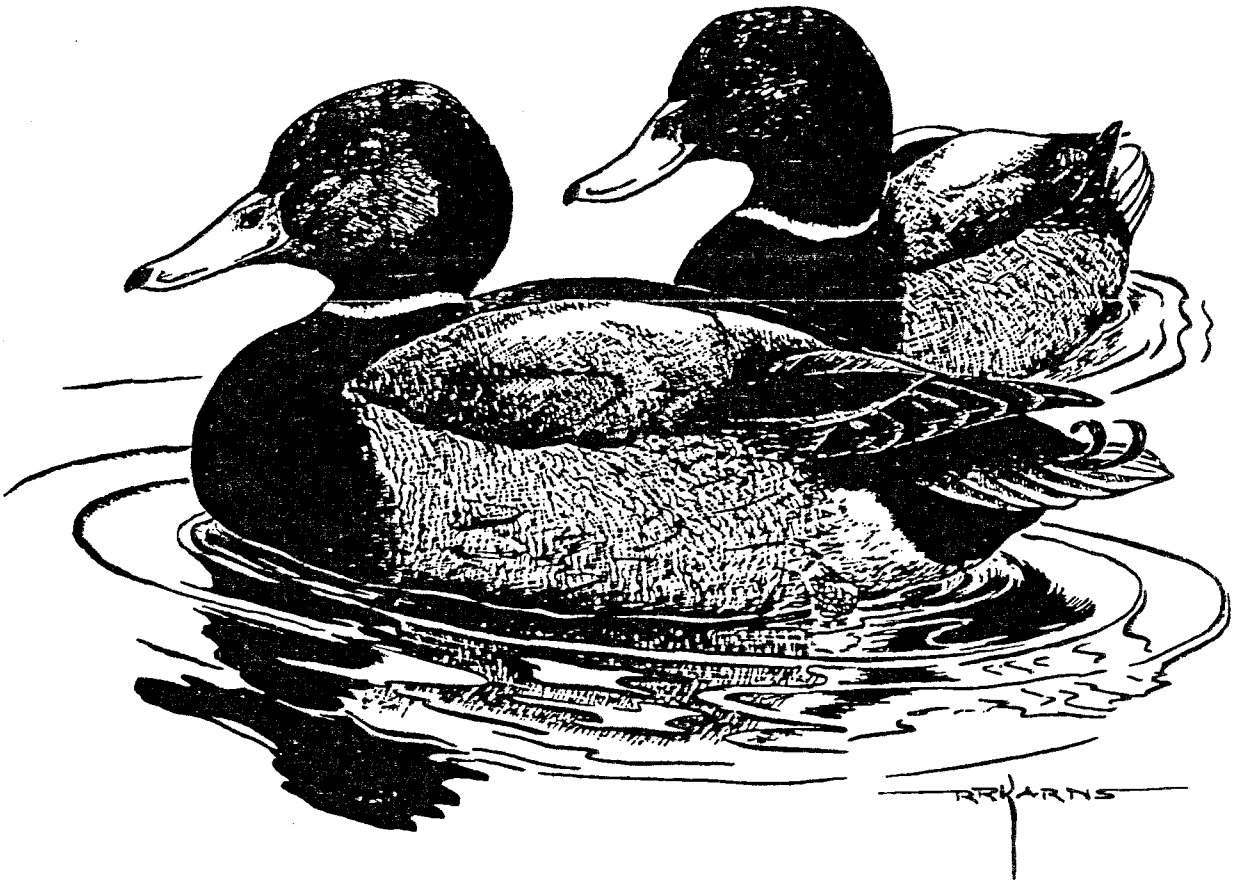
KING'S MARK ENVIRONMENTAL REVIEW TEAM



REPORT FOR

HIDDEN LAKE SUBDIVISION

COLEBROOK,
CONNECTICUT

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

HIDDEN LAKE 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.

APRIL 1989

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
  Department of Environmental Protection - Natural Resource Center

* Alan Page, Soil Conservationist
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  Department of Environmental Protection - Water Resources Unit

* Christopher Vann, Flood Management Technician
  Department of Environmental Protection - Water Resources Unit

* Daniel Mayer, Wetland Specialist
  Department of Environmental Protection - Water Resources Unit

* Judy Wilson, Wildlife Biologist
  Department of Environmental Protection - Western District

* Richard Lynn, Planner
  Litchfield Hills Council of Governments

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, Jerry Rathbone, Diana Holcomb, Steven Allyn and George Collins of the Colebrook Inland Wetlands Commission, George Bodycoat of the Colebrook Planning and Zoning Commission, Franklin Fredsall, adjacent land owner, John Casey, Diversified Technologies and David Lord, soil consultant for the developer, 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 Hidden Lake, a 144.91-acre site proposed for subdivision development. The site contains second growth forest with some open areas. The central parts of the property contain Hidden Lake (a man-made pond) and Beaver Pond (a beaver swamp) with associated wetlands. There is a large wetland associated with Mill Brook at the western edge of the property. The steepest slopes are located in the central portions on the hill west of the pond.

The proposed subdivision encompasses 43 house lots, ranging in size from 1.86 acres to 3.57 acres. Two roads and a cul-de sac are proposed to serve the subdivision. Four wetland crossings are proposed. The subdivision would rely upon on-site septic systems and wells.

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. The major findings of the ERT are presented below:

Setting and Zoning

The site is bounded by Pinney Street, the Algonquin State Forest and private undeveloped land. The site is located in a 2-acre zone.

Topography

The elliptically shaped hill is a rock-core drumlin. Elevations range from 1200 to 1320 feet above sea level. Slopes range from gentle to steep.

Geology

The bedrock underlying the site has been mapped as a dark gray, rusty-weathering schist and gneiss and a gray, medium-grained, well-layered gneiss. The rock types are separated by the Woodruff Mountain Thrust. Deep test hole information indicates that depths to bedrock are 6 feet or more in most places.

The drumlin and the bedrock are covered by till. Most areas have a compact zone, called a hardpan, 2-3 feet below the ground surface. The remainder of the site has a sandier, looser variety of till that is shallow to bedrock. Wetland soils, which overlay the till, consist of Leicester, Ridgebury and Whitman complex and peat and muck deposits.

Water Supply

The water supply for each lot is a well drilled into the bedrock. The casing should extend at least 5 feet into the bedrock, but where there is a caving zone, the casing should extend below the caving zone. The availability of water from the bedrock should be sufficient for domestic use. Wells should be separated by 200 feet or more to provide an adequate recharge zone. All wells should be constructed by licensed well drillers and be inspected by the Town sanitarian. The natural quality of the ground water should be good. There may be elevated iron and manganese levels which may necessitate appropriate treatment systems.

Sewage Disposal

The major limitations to subsurface sewage disposal are areas of moderate to steep slopes, hardpan soils and shallow to bedrock soils. These limitations will also hinder road and driveway construction. Subsurface data indicates that special engineered design plans will be needed. Improvements such as intercepting drains and/or elevated areas for leaching systems are needed for lots with high water tables. Shallow, spread out leaching systems may be needed for shallow to bedrock areas.

Buildings in areas of hardpan soils should have footing drains to keep basements dry. The engineer should locate the discharge points for the curtain drains and footing drains to avoid gullying, well contamination and interference with septic systems. The separating distances for septic systems with curtain drains are critical. Road construction on hardpan soils is difficult since cuts into the hardpan may cause seepage and slumping. These slopes are difficult to stabilize. Leaching fields must be kept at least 75 feet from cut slopes to prevent effluent from bleeding out at these points. Before subdivision approval, all lots should be shown to meet the minimum soil standards in the Public Health Code. Every effort should be made to keep septic systems as far as possible from Hidden Lake and Beaver Pond to protect water quality.

Hydrology

Drainage from the site flows into Mill Brook either directly or through the unnamed brook flowing through Beaver Pond and Hidden Lake. Development of the property will cause some increase in runoff depending on the extent of the development. The major concerns are potential flooding downstream and streambank erosion. A stormwater management plan including pre- and post-development hydrology should be provided to the Town.

Beaver Pond, Hidden Lake and Mill Brook appear to have some natural detention capabilities. In order to protect the water quality, sedimentation basins should be considered. There are 4 proposed wetland crossings. The 2 major crossings are across the Hidden Lake spillway and between Beaver Pond and Hidden Lake. This second crossing should be aligned with the existing woods road, if possible, to reduce the wetland impacts. All wetland crossings will require a permit by the Inland Wetlands Commission. Crossings should occur where there is the

least amount of wetland disturbance. Although undesirable, wetland crossings are feasible, provided they are properly engineered. Coordination with the DEP Dam Safety Unit is essential for the modifications of the Hidden Lake spillway.

Soil Resources

The soils on the site include Charlton, Hollis, Paxton and Leicester soils. The major limitations are slope, erosion hazard, wetness and shallow soils. The areas which will require engineered septic systems include areas where slopes exceed 15%, areas where percolation rates exceed 30 minutes per inch, areas where seasonal high water tables are less than 3 feet below surface and areas where depth to bedrock is less than 72 inches.

Erosion and Sediment Control

The soil erosion and sediment control plan is basically adequate. Recommendations include using silt fence rather than hay bales, extending E&S controls on Hidden Lake Road, providing silt fence on the south side of Forest Road near the wetlands and including locations for topsoil stock piles, seeding information and person responsible for maintenance on the plans. Maintenance of the E&S controls is extremely important for protecting the wetlands and soil resources.

Flood Hazard Considerations

The Flood Insurance Rate Map shows flood hazard areas only for Mill Brook. The watershed for Hidden Lake is smaller than the National Flood Insurance Program generally studies. No development is planned for the flood hazard area, therefore only basic flood hazard protection methods apply.

The proposed changes in the dam will increase the flood elevation in Hidden Lake approximately 1.75 feet. The impact should be minimal because no structures, wells or septic systems fall within this boundary. The SCS dam design data differs from the data provided by the applicant. The applicant used a 6-hour, 100-year storm event, which is adequate, but the 24-hour, 100-year storm event is preferred for the calculations. The environmental impact from the new flood elevations for Hidden Lake should be minimal. The flood elevations for the Forest Road crossing may increase the size of Beaver Pond by 1.5 acres. While this should have no impact on structures, wells or septic systems, the water may damage trees and beaver dams and drive animals from the shorelines. The flood elevations may also extend off site, impacting upstream property owners. Additional information needed includes analysis using 24-hour, 100-year rainfall data, alternative design plans for Forest Road and a stormwater management plan.

Wetland Considerations

The wetlands found on-site are associated with watercourses, Hidden Lake and Beaver Pond. Wetland functions include flood storage, water conveyance, wildlife habitat, research and educational potential and aesthetics. The wetlands are of excellent quality and functional value.

Direct impacts to the wetlands include 4 crossings. Two of the crossings do not present significant impacts, although some sort of structure should be used to prevent the alteration of the hydrologic character. The crossing between Hidden Lake and Beaver Pond will require 10,000 cubic yards of fill to achieve the proposed grades. In addition of the loss of the wetland functions, there is the potential for sedimentation and erosion due to the slopes and flooding if the beaver dam should breach. The crossing for Hidden Lake Road is of concern due to the steep slopes and the potential for erosion and sedimentation. Also, the proposed driveways for Lots 21 through 25 will either be very steep or require deep cuts which increases the potential for erosion. Comments include showing all the drainage swales and logging roads on the plans, providing alternatives for the Forest Road crossing, establishing deed restrictions for the Mill Brook wetlands and reviewing the plans with the staff of the DEP Water Resources Unit.

Wildlife Considerations

Habitat on the site includes coniferous/hardwood forests, forest openings, old fields, open fields and wetlands. The area offers a variety of food and cover to wildlife including deer, grouse, beaver, otter, mink, raccoon, fox, coyote, various birds, reptiles and amphibians. The site offers good to excellent wildlife habitat.

As with any development, the impact on wildlife habitat will be negative. Wildlife habitat will be broken up and lost with the construction of roads, driveways, walkways, parking areas and homes. Other impacts include the creation of lawns and the presence of humans, traffic, dogs and cats. The medium sized houselots as proposed will augment the negative impacts on wildlife. Larger lots or cluster housing can lessen the impacts by leaving more land undisturbed. Wetland use by wildlife can be preserved by the use of a 100-foot buffer. If wetlands are crossed, large box culverts are preferred to round or squash culverts for wildlife movement. Also, beaver are less likely to dam a box culvert.

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.

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"on the site.

Planning Considerations

The proposed subdivision represents a density greater than the existing development pattern. The lots are consistent with the zoning regulations, but little meaningful open space has been provided. The project would be more consistent if more open space was provided. The State Policies Plan for the Conservation and Development of Connecticut has classified the land area as rural land and the Mill Brook wetlands as a conservation area. The project would be more compatible with

the State Plan if more attention were given to preserving the rural character of the site. The LHCEO preliminary housing policy supports development that accommodates environmental limitations and encourages innovative planning. The project could be modified to meet these objectives.

Comments on the site plan include establishing a streambelt/open space corridor along Mill Brook, protecting the rural character by clustering the houses in the eastern parts, ensuring that sight line distances are adequate, having a driveway drainage plan for driveways with grades over 15%, protecting the streambelt corridor of the 2 ponds and redesigning the lots west of the ponds to protect the rural character.

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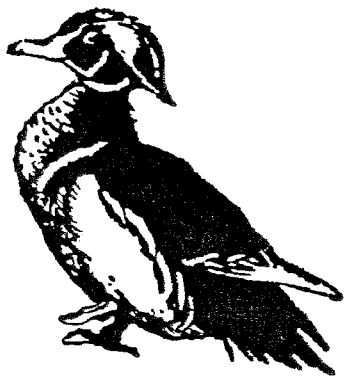


7) Assess the impact of the development on the wildlife including alternatives for consideration; and

8) Assess planning and land use issues.

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 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 February 22, 1989. 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, they were able to analyze and interpret their findings. The results of this analysis 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

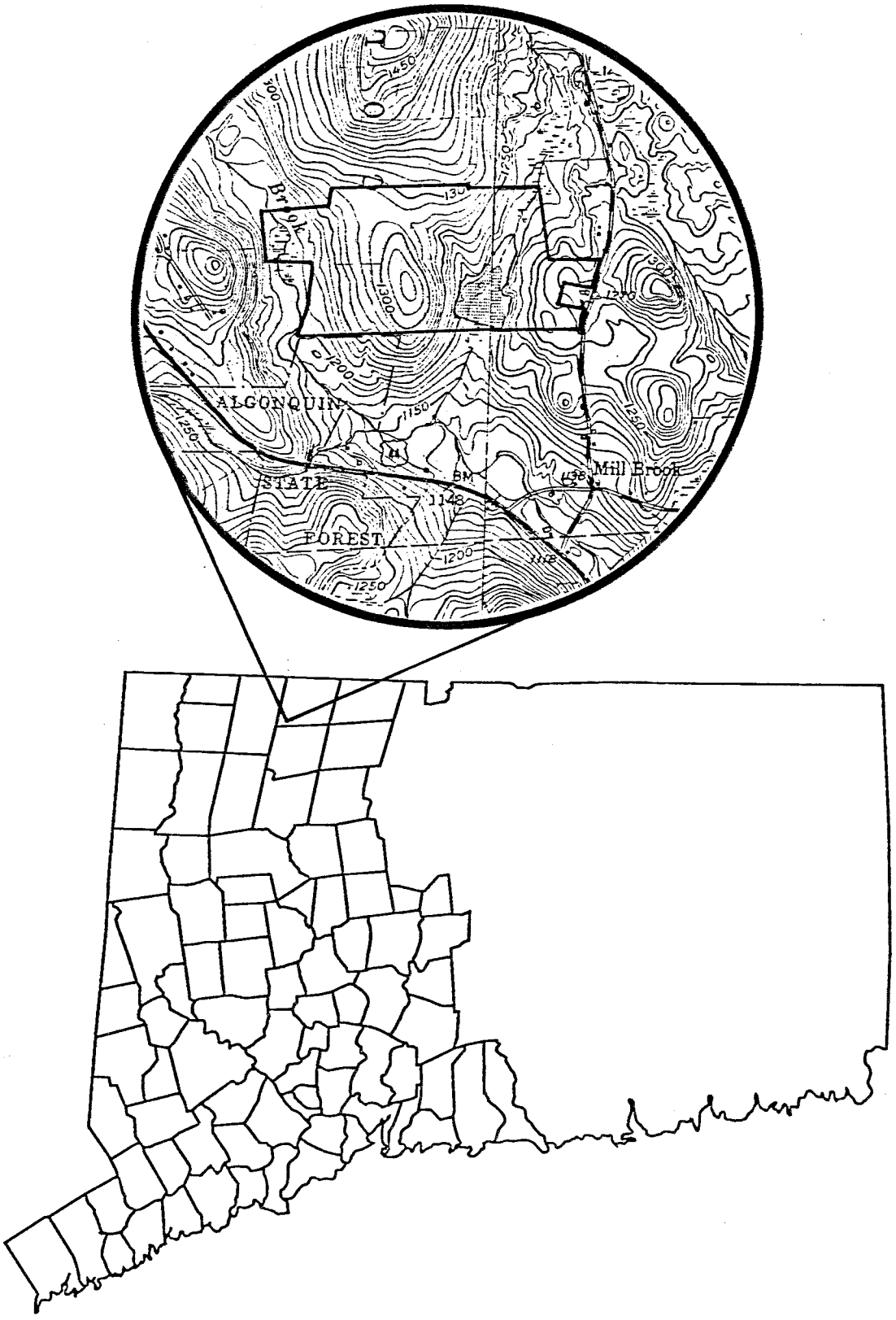
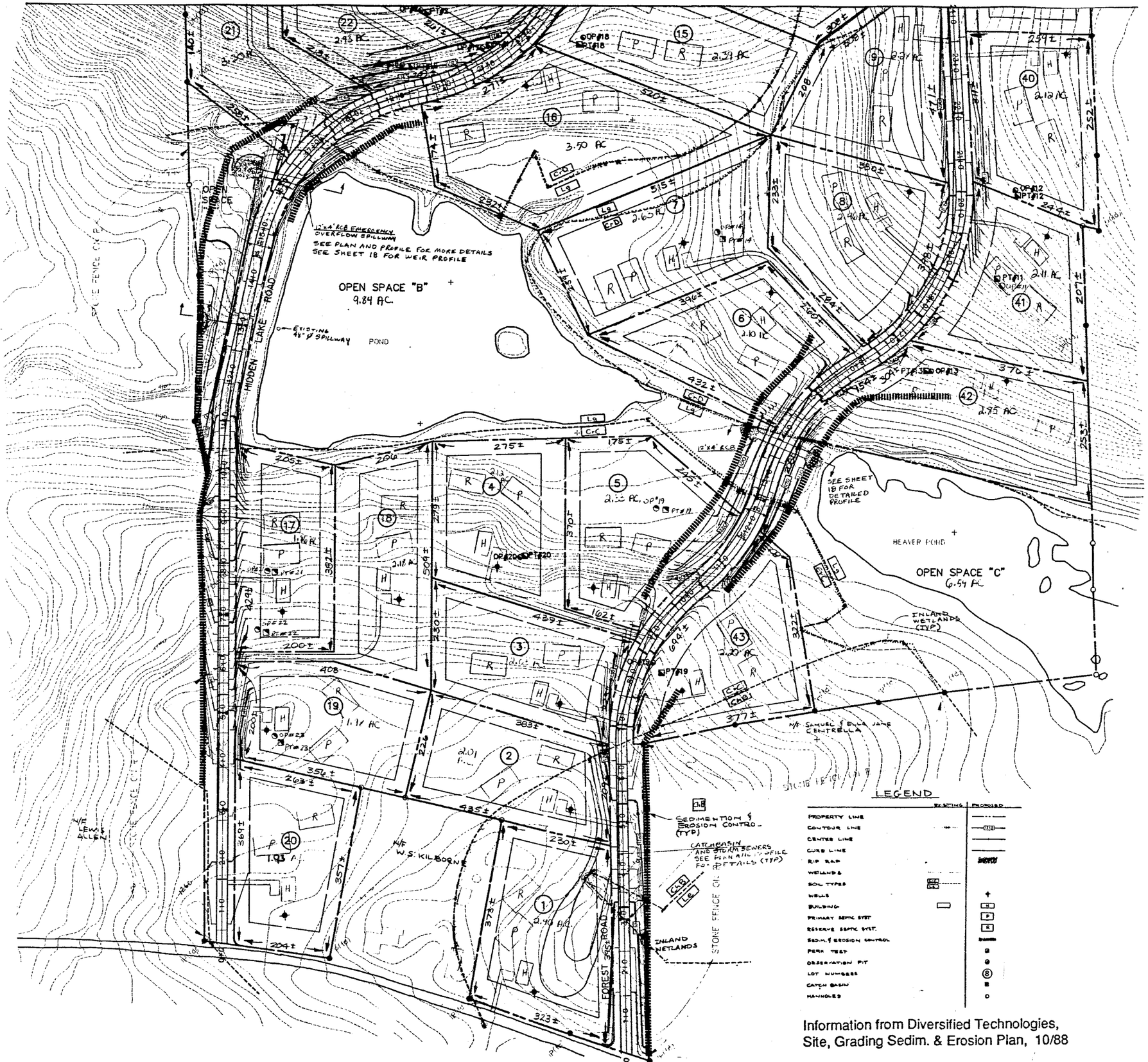


Figure 2



Information from Diversified Technologies, Site, Grading Sedim. & Erosion Plan, 10/88

ChB Charlton stony fine sandy loam, 3-8% slopes
CrC Charlton very stony fine sandy loam, 3-15% slopes
CrD Charlton very stony fine sandy loam, 15-35% slopes
HxC Hollis extremely rocky fine sandy loam, 3-15% slopes
Le Leicester stony fine sandy loam
Lg Leicester, Ridgebury and Whitman very stony fine sandy loam
PeC Paxton stony fine sandy loam, 3-15% slopes

HIDDEN LAKE SUBDIVISION

COLEBROOK, CONNECTICUT

King's Mark Environmental Review Team

Scale: 1" = 200'

Site Plan - East Half

Figure 3

LEGEND

	EXISTING	PROPOSED
PROPERTY LINE		
CONTOUR LINE		
CENTER LINE		
CURB LINE		
RIP RAP		
WETLANDS		
SOIL TYPES	HxC LE	
WELLS		
BUILDING		
PRIMARY SEPTIC SYST.		P
RESERVE SEPTIC SYST.		R
SED. & EROSION CONTROL		
PERK TEST		
OBSERVATION PIT		
LOT NUMBERS		
CATCH BASIN		
MANHOLES		

Information from Diversified Technologies, Site, Grading, Sedim. & Erosion Plan, 10/88

ChB Charlton stony fine sandy loam, 3-8% slopes
CrC Charlton very stony fine sandy loam, 3-15% slopes
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HIDDEN LAKE SUBDIVISION

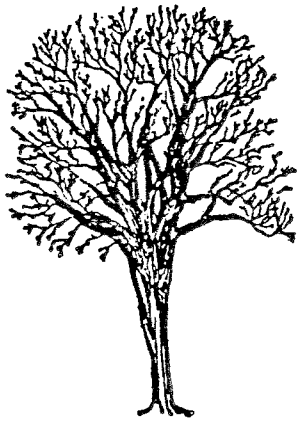
COLEBROOK, CONNECTICUT

King's Mark Environmental Review Team

Scale: 1" = 200'

Site Plan - West Half

PHYSICAL CHARACTERISTICS



Site elevations generally range from 1320 feet above mean sea level at the top of the drumlin to about 1200 feet above mean sea level at the Hidden Lake dam (see Figure 4). Slopes on-site range from gentle (eastern parts and tableland of the drumlin) to steep (central and western parts). Steepest slopes are concentrated on the east flank of the drumlin.

GEOLOGY

The bedrock geology is described by John Rodgers in the Bedrock Geological Map of Connecticut, 1985. The rock core of the the site consists of a layered gneiss and a rusty mica schist and gneiss. The 2 rocks types are separated by the Woodruff Mountain Thrust fault, an area of faulted and foliated bedrock. Additionally, a northwest-southeast trending fault, generally parallel to the Woodruff Mountain Thrust, is located east of the site. These fault zones are structural features that formed during the geologic past and are no longer experiencing active movement. Because of the site's proximity to these former bedrock fault zones, the underlying bedrock may be fractured and weathered (see Water Supply section).

Except for the western limits, the site is underlain by a dark gray, rusty-weathering schist and gneiss (see Figure 5). The western limits are underlain by a gray, medium-grained, well-layered gneiss. The bedrock structure has influenced the shape of the landforms and the drainage patterns on the site.

Schists and gneisses are crystalline rocks that have been geologically altered by great heat and pressure within the earth's crust (metamorphism) one or more times during the period following their disposition as deep ocean sediments and/or volcanic material. The terms "schists" and "gneisses" refer to the textural and structural aspects of the rocks. The stresses of deformation caused the alignment of platy, flaky

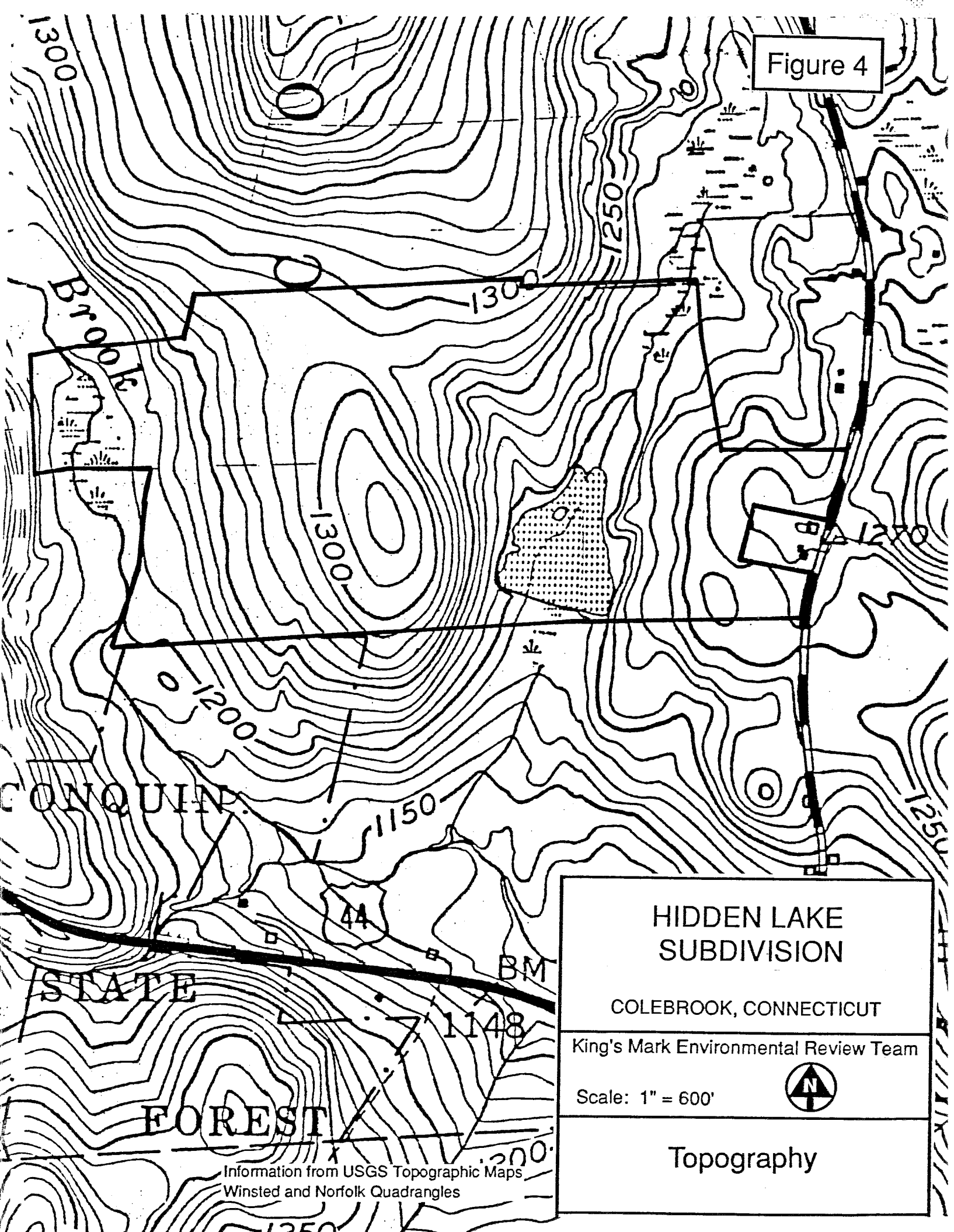


Figure 4
1300
1250
1300
1270
1200
1150
CONQUIN
44
STATE
BM
1148
FOREST
1250
HIDDEN LAKE
SUBDIVISION
COLEBROOK, CONNECTICUT
King's Mark Environmental Review Team
Scale: 1" = 600'
N
Topography
Information from USGS Topographic Maps
Winsted and Norfolk Quadrangles

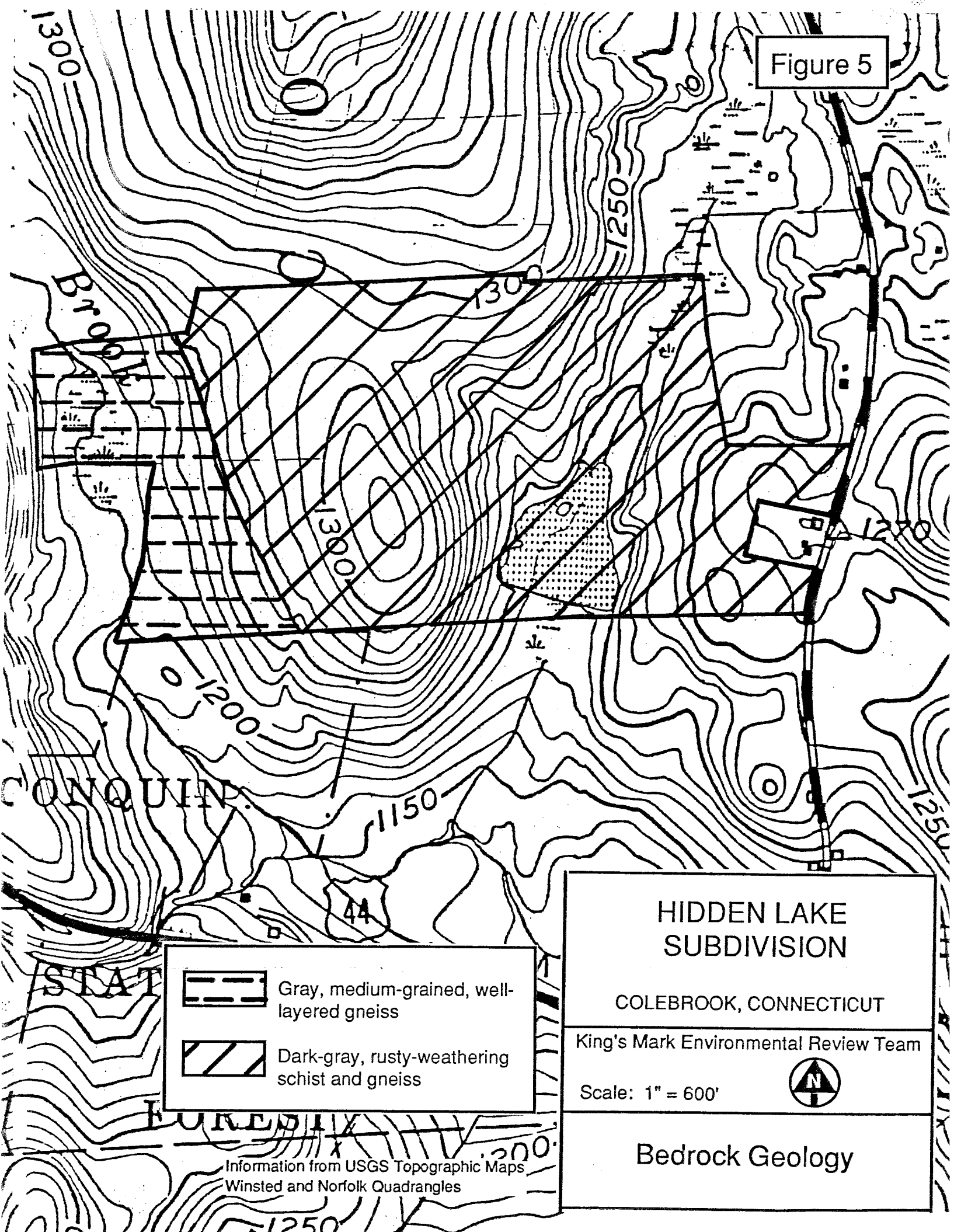


Figure 5
1300
1250
1300
1300
1200
1150
1250
1270
CONQUIN
44
STAT
EUREKA
1200
1250
Gray, medium-grained, well-layered gneiss
Dark-gray, rusty-weathering schist and gneiss
HIDDEN LAKE SUBDIVISION
COLEBROOK, CONNECTICUT
King's Mark Environmental Review Team
Scale: 1" = 600'
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Bedrock Geology
Information from USGS Topographic Maps
Winsted and Norfolk Quadrangles

and elongate minerals into thin sheets or bands. Where the alignment has resulted in a slabby rock (i.e., one that parts relatively easily along the surface of mineral alignment or foliation planes), the rock is termed a "schist." Where the alignment has resulted in a banded but more massive rock, the rock is termed a "gneiss." Both rock types may grade into one another in a single outcrop.

Deep test hole information compiled for subsurface sewage disposal exploration indicates that depths to bedrock of about 6 feet were obtainable in most places.

The elliptically shaped hill west of the lake is a drumlin composed predominantly of a glacial sediment known as till. The remainder of the site is also covered by till (see Figure 6). The till consists of ground-up rock fragments and particles which were plastered by moving glacial ice onto the underlying bedrock. Because of this mode of deposition, a relatively shallow "hardpan" layer is present 2-3 feet below ground surface. The "hardpan" layer is located beneath the weathered and rooted surficial soil zone. Except for the tableland and east flank, the drumlin hill consists of "hardpan" soils. The texture of the till covering the remainder of the site appears to be a sandier and looser variety which is shallow to bedrock. The thickness of the till on the site probably does not exceed 10 feet in most places.

Wetland soils on the site have been mapped by a certified soil scientist. The boundaries of the soils have been superimposed onto the subdivision map. According to the Soil Survey for Litchfield County, most of the wetland soils consist of the Leicester, Ridgebury and Whitman (very stony variety) complex. The remainder consists of peat and mucks and occurs along the Mill Brook in the western parts and in and around Beaver Pond in the eastcentral parts. Each wetland corridor has a stream/brook traversing through it, outletting into Hidden Lake and/or Mill Brook.

WATER SUPPLY

The water supply for each lot in the proposed subdivision would be derived from drilled (6 inch diameter) wells with steel pipe cased firmly into solid rock and completed as open boreholes in the underlying bedrock. In general, the casing should extend at least 5 feet into the bedrock. However, if there is a caving zone in the bedrock, the casing should extend below the caving zone so that well stability is insured. The well driller will need to determine this for each case.

A typical well depth for a bedrock well ranges from 150-300 feet. Although the bedrock is not known to be a prolific aquifer, Water Resources Bulletin No.29 (Farmington River Basin) indicates that of 331 wells surveyed which tap metamorphic bedrock, 90% yielded 1 gallon per minute or more, 70% yielded about 3 gallons per minute or more and 50% yielded about 5 gallons per minute or more. Generally speaking, a yield of 2-3 gallons per minute is desirable for domestic purposes.

Because of relatively large lot sizes proposed (about 2.0 to 3.5 acres) and because a portion of the renovated domestic wastewater will percolate downward to recharge the underlying bedrock, the annual groundwater usage for the site should not exceed annual groundwater recharge. As long as the underlying bedrock is fractured and capable of transmitting water to drilled wells, the bedrock aquifer can be expected to adequately meet the water demands of the proposed subdivision. Since lots are about 2 acres or more in size, every effort should be made to separate neighboring wells by 200 feet. This appears to be attainable, and if accomplished, each well would have about 1 acre of recharge per well or about 595 gallons per day. The latter assumes the recharge rate of about 8 inches per year for an upland till-covered site.

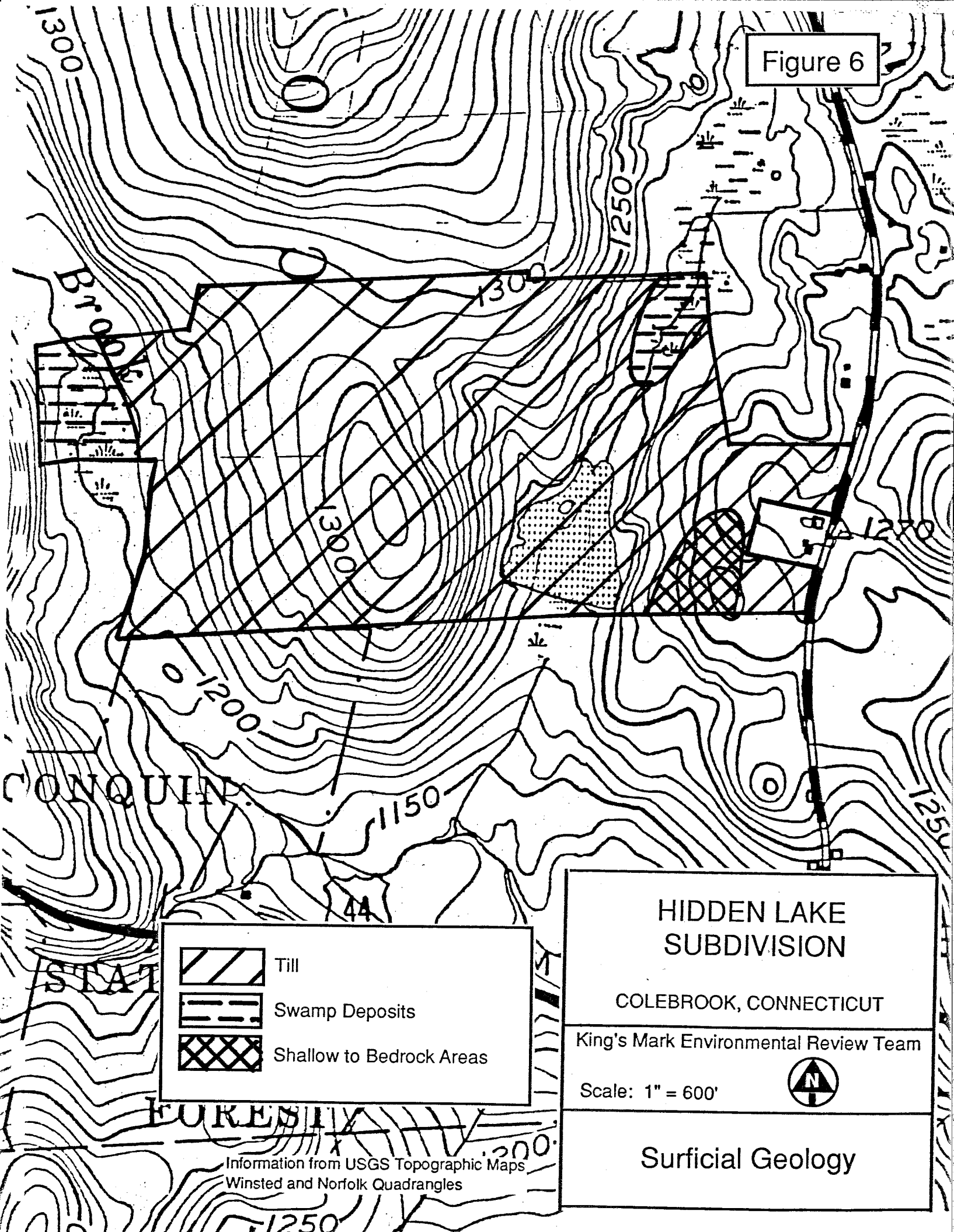
Figure 6
1300
1250
1300
1270
1200
1150
CONQUIN
Till
Swamp Deposits
Shallow to Bedrock Areas
HIDDEN LAKE SUBDIVISION
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King's Mark Environmental Review Team
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Surficial Geology
Information from USGS Topographic Maps
Winsted and Norfolk Quadrangles

Subsurface data supplied by the applicant's engineer indicates that special engineered design plans will be required for most, if not all, lots in order to surmount the geologic limitations. For example, improvements such as intercepting drains and/or elevating areas designated for leaching systems with suitable fill material will be required for lots with high groundwater conditions. Sufficient exploratory work is warranted on the lots that are characterized by shallow to bedrock conditions. In areas of thin coverage and "hardpan" layers, leaching systems should be kept shallow, relatively large and spread out with the contours to encourage lateral dispersal. Every effort should be made to keep leaching systems in areas where slopes do not exceed 25%. Cut and fill systems in these areas should be avoided.

The potential for seasonally high water tables associated with the "hardpan" soils, especially those west of Beaver Pond and Hidden Lake, suggests that building footing drains be installed around homes. This should protect basements from getting wet during the winter and spring months. It is possible that the building footing drains can be connected to intercepting drains (curtain drains). The project engineer should address where each curtain drain will be located and discharged so that problems such as gullying, well contamination or interference with on-site or neighboring septic systems do not occur. These drain locations should be determined prior to subdivision approval.

Since many lots potentially could utilize intercepting drains in the central and western parts, the separation distances between septic systems on abutting lots becomes critical. Upgrade lots may have to be widened to ensure that their sewage disposal systems are at least 50 feet away from downgrade curtain drains.

Road construction on "hardpan" soils particularly in cut areas, can be problematic if not properly addressed. Roads on cut areas should have a good gravel subbase and underdrains on either side of the road. They are extremely difficult to stabilize due to seepage of water over the "hardpan" layer. The water creates an

unstable condition just below the seepage line, and the weight of the unstable soil causes the soil to flow down the slope. Once this begins, the slope is very difficult to stabilize. The establishment of a good vegetative cover is practically impossible on these eroding slopes. Besides the unsightly conditions, the eroded soil must be removed from the base of the slope. Also, leaching fields should be set back at least 75 feet from the cut embankment area to prevent partially treated effluent from bleeding out at these points.

Before subdivision approval, the applicant's engineering firm must show that each of the proposed lots in the subdivision meets the minimum soil standards set forth in Section 19-13-B103e(a)(3) of the State Public Health Code.

The approval of septic systems should be a coordinated effort between the design engineer and the Town sanitarian. Because most of the lots will be deemed of "special concern" by the State Public Health Code, plans for the design of the subsurface sewage disposal facilities (along with the placement of each on-site well water supply) must be prepared by a professional engineer and submitted to the Health Department for review and approval by their certified staff. The final configuration of lots should not be approved until the Health Department is assured that each lot meets all of the State Health Code Requirements.

Every effort should be made to protect Hidden Lake and Beaver Pond from septic tank effluent. It is suggested that septic systems be set back as far as possible from the high water mark of Hidden Lake and Beaver Pond.

HYDROLOGY

Drainage within the site can be divided nearly in half (see Figure 7). Surface drainage in the western parts drains westward to Mill Brook. At its outflow to Mad River, Mill Brook drains an area of 5.26 square miles or 3366 acres. Most of the land

in the central and eastern parts of the site drains to Hidden Lake, Beaver Pond or the unnamed streamcourse connecting the 2 bodies of water. The unnamed outlet stream for Hidden Lake is tributary to Mill Brook. It flows into Mill Brook about 1400 feet south of the spillway. At its intersection with the Hidden Lake spillway, the unnamed streamcourse drains an area of about 400 acres. Finally, a very small land area in the southwest corner drains to a topographic swale which routes surface water to Mill Brook.

Development of the site for residential use is expected to increase the amount of runoff shed from the site. The amount of increases will depend upon the extent of the development, the impervious surfaces created and the amount of vegetation removed or preserved. The major concerns with increased runoff are the potential for flooding of downstream areas and streambank erosion. In order to determine the effects of post-development runoff, the applicant's engineer should produce a stormwater management plan including pre- and post-development hydrologic calculations. These calculations have not been provided to date. The applicant's engineer has provided computations for pipe sizes serving the proposed road system, the spillway road crossing and the wetland road crossing between Beaver Pond and Hidden Lake. Once these calculations, an assessment of downstream effects and plans for control of stormwater are completed, they should be submitted to the Town for review. Calculations should be developed using the appropriate method selected from Chapter 9 of the Connecticut Guidelines for Soil Erosion and Sediment Control (1985). Designs for sediment basins and stormwater detention basins must use the criteria and standards found in the Guidelines.

Town officials should receive a report from the project engineer which states initial conditions and storm frequencies to be analyzed. A summary table showing the pre-development, post-development and designed system peak discharge for all design frequencies should also be included.

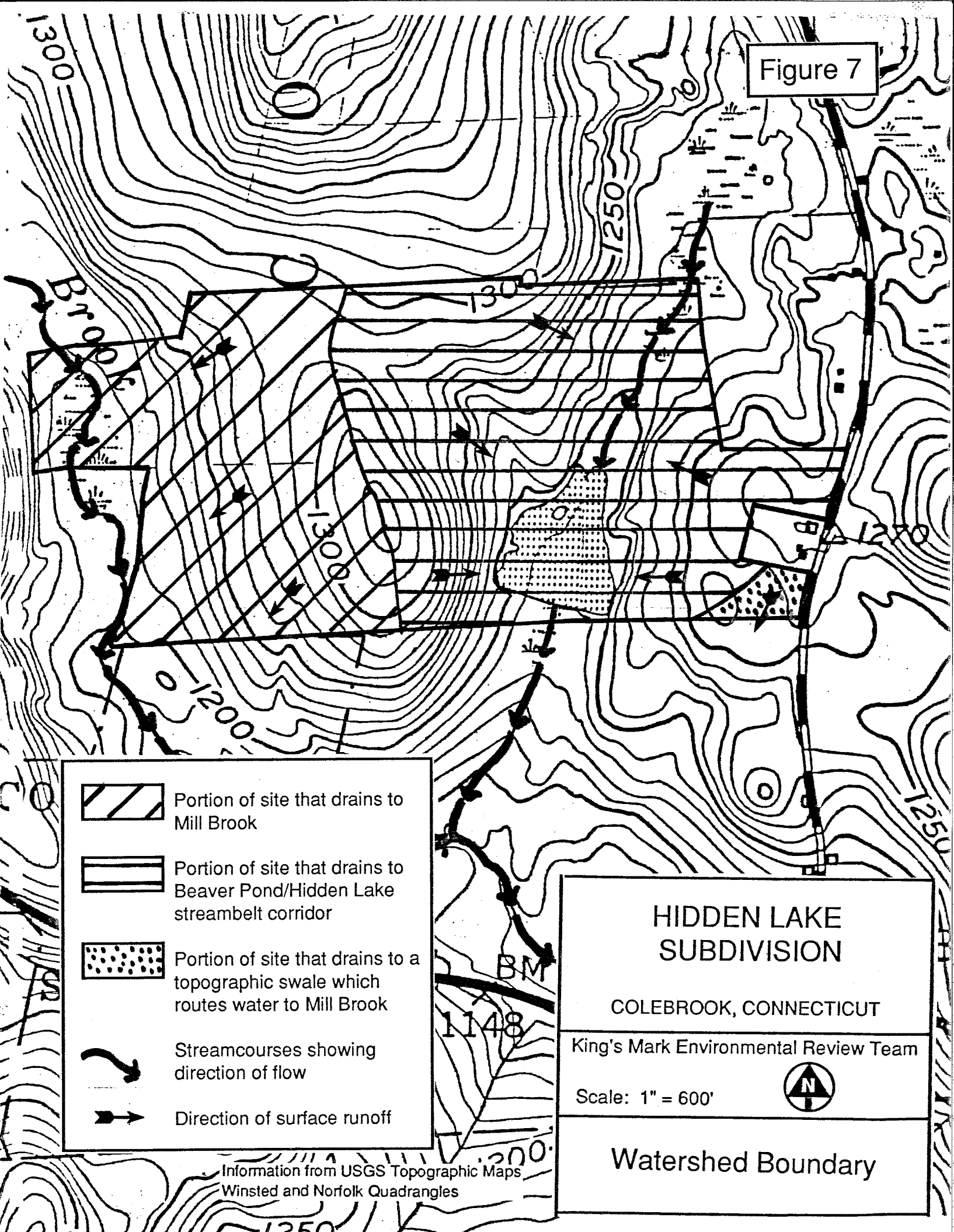
Figure 7
Portion of site that drains to Mill Brook
Portion of site that drains to Beaver Pond/Hidden Lake streambelt corridor
Portion of site that drains to a topographic swale which routes water to Mill Brook
Streamcourses showing direction of flow
Direction of surface runoff
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King's Mark Environmental Review Team
Scale: 1" = 600'
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Watershed Boundary
Information from USGS Topographic Maps
Winsted and Norfolk Quadrangles

replaced with a permeable road base material. Culverts should be properly sized and located so they do not alter the water levels in the wetland or cause flooding problems.

Classified inland-wetland soils in Connecticut are regulated under Public Act 155. Any activity which involves modification, fillings, removal of soils, etc. will require a permit and ultimate approval by the Town's Inland Wetland Commission. In reviewing a proposal, the Commission needs to determine the impact that the proposed activity will have on the wetlands. If Commission members determine that the wetland is serving an important hydrological or ecological function and that the impact of the proposed activity will be significant, they may deny the activity altogether, or at least require measures that would minimize the impact.

Coordination with the Department of Environmental Protection (DEP) Dam Safety Unit (Hartford 566-7245) is essential for the proposed modifications at the Hidden Lake spillway.

SOIL RESOURCES

The soils within the proposed Hidden Lake subdivision include: ChB, CrC, CrD, HxC, Le, Lg and PeC soil mapping units. These soils are described below (see Figures 2 and 3):

1) Leicester (Le and Lg) soils are inland-wetland soils. Flooding and wetness are the most limiting features for development.

2) Charlton (ChB, CrC, CrD) soil is a deep well-drained soil. Permeability is moderate to moderately rapid in the surface layer and subsoil. Runoff is a hazard on this soil, and unprotected areas are subject to erosion. Slope is the most limiting feature of this soil for development. The erosion hazard is HIGH due to steep slopes. CrC and CrD are very stony and on very steep slopes. Limitations for ChB are minimal.

3) Hollis (HxC) soil is well-drained or excessively drained, steep and very shallow to shallow over bedrock. Slope and shallow depth are the most

limiting features of this soil for development. The erosion hazard is HIGH due to steep slopes.

4) Paxton (PeC) soil is well-drained with a dense layer (hardpan) at about 24 inches in depth. This "hardpan" can cause engineering limitations on septic system design and cause a slow percolation rate. Cut slopes in this soil are likely to have seeps flowing out during wet periods, and subsurface drainage maybe required. PeC is very stony.

These soil mapping units are described more fully in the Soil Survey of Litchfield County (1970). Tables 1, 2 and 3 in Appendix A summarize the soil conditions on-site.

The soil limitations which are identified do not preclude development. They do indicate the need for more precise planning and careful review of proposed project components. In some cases, the cost of development 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. Special conditions to consider include, but are not limited to:

1) Areas where slopes exceed 15%;

2) Areas where percolation rates exceed 30 minutes per inch;

3) Areas where the seasonal high water table is less than 3 feet below the soil surface; and

4) Areas where depth to bedrock is less than 72 inches.

Periodic field inspection and documentation during construction may be necessary to ensure installation compliance and project success.

EROSION AND SEDIMENT CONTROL

The following comments and recommendations refer to the soil erosion and sediment (E&S) control plan for this proposed subdivision dated October 1988.

1) Wetlands

   a) Use silt fencing, rather than hay bales, as the primary E&S control adjacent to and within wetlands.

   b) Retain and maintain silt fencing adjacent to and within wetlands until all construction activities in these areas are completed and disturbances have been stabilized.

   c) Extend the E&S controls on the north side of proposed Hidden Lake Road, from survey station 15+50 back to 10+50. This will help to prevent sediment from entering the pond during road construction.

   d) Provide silt fencing on the south side of the proposed Forest Road from survey station 2+50 to 3+50. This will help prevent sediment from entering the wetlands during road construction.

2) Provide construction entrances at the beginning of the proposed Hidden Lake and Forest Roads. These entrances will help to prevent sediment from being tracked onto Pinney Street during road construction.

3) Indicate directly on the plan items including, but not limited to:

   a) Location(s) of stockpiled topsoil;

   b) Seeding information such as seeding mixture, lime and fertilizer requirements, mulch quantities and techniques and seeding dates; and

   c) Person(s) responsible for implementing and maintaining E&S plan.

4) The recommended dates for establishing permanent vegetation are:

   April 15 through June 15
   August 15 through September 15

5) The key to successful E&S is proper installation and maintenance. This is extremely important when considering the existing or potential erosion hazards associated with steep slopes and wetlands protection.

The proposed activities associated with Hidden Lake 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-site.

The E&S control plan is basically adequate. Additional recommendations are provided. However, construction activities associated with steep slopes, wetlands and other soil limitations must be carefully monitored to protect the soil resources from erosion or sediment damage.

FLOOD HAZARD CONSIDERATIONS

The inventory of existing flood information consists of the information provided by Diversified Technologies Corporation (DTC), the original Soil Conservation Service (SCS) dam design plans of Schwartz's Dam dated February 1964 and the National Flood Insurance Program (NFIP) flood insurance study and mapping of Colebrook dated June 3, 1986. Because the SCS plans are specific to the dam, the information contained in the NFIP study will be addressed first, and reference made to the SCS plans when specific dam design concerns arise.

NFIP's Flood Insurance Rate Map, panel 15B, shows flood hazard areas on the site only for Mill Brook (Figure 8). This A zone area represents the flood boundaries of the flood having a 1% chance of occurring in any given year (the 100-year flood). Flood hazard areas have not been designated for Hidden Lake, the unnamed tributary feeding the lake or Beaver Pond because the size of their watershed is smaller than those normally considered by the NFIP. Furthermore, 100-year flood elevations have not been determined for the Mill Brook area or for any mapped flood hazard area in Colebrook, because the NFIP categorizes Colebrook as minimally flood prone and not having significant development plans along potentially flood hazardous streams or rivers.

The NFIP mapped flood hazard area existing for Mill Brook totals approximately 8 acres located in the westernmost section of the property in an area designated as open space. No development is planned within this mapped A zone.

Therefore, only basic flood hazard protection measures as designated by the NFIP requirements in Section 60.3(a) of Code 44 of Federal Regulations and adopted by the Town of Colebrook apply. These basic requirements include reviewing all permit applications to determine whether proposed building sites will be reasonably safe from flooding. More specifically, the Town administrator shall review proposals to ensure that structures are anchored and built of materials resistant to flood damage, built using methods and practices that minimize flood damages, constructed with public and private utilities (including sewer, gas, electrical, heating, ventilation, air conditioning and water) that are designed and/or located to prevent water from entering or accumulating.

The hydraulic and hydrologic report provided by DTC is based on SCS and the U.S. Geological Survey models commonly in use today. Results from this report indicate that the existing and proposed 100-year flood elevations for Hidden Lake are 1200.90 feet and 1202.65 feet, respectively. The proposed 100-year flood elevation is 1.75 feet over existing 100-year flood elevations and 3.0 feet over normal lake surface elevations. This 1.75-foot increase would result from the reduced width and discharge rate of the proposed emergency spillway to facilitate a road crossing over the dam.

The impacts of this increased flood elevation on proposed building sites is minimal. For example, none of the proposed septic systems or wells fall within this boundary. The closest septic systems are reserve systems for Lots 4, 7 and 16, each approximately 80.0 feet from the proposed 100-year flood elevation boundary of 1202.65 feet. Of the 7 lake-front lots' primary septic systems, 2 are approximately 100.0 feet away (Lots 4 and 7) and 5 are close to 200.0 feet away from proposed 100-year flood elevations.

It should be noted that SCS dam design plan data differs from data provided by DTC. Of particular interest is SCS's 100-year existing flood elevation of 1203.0 feet,

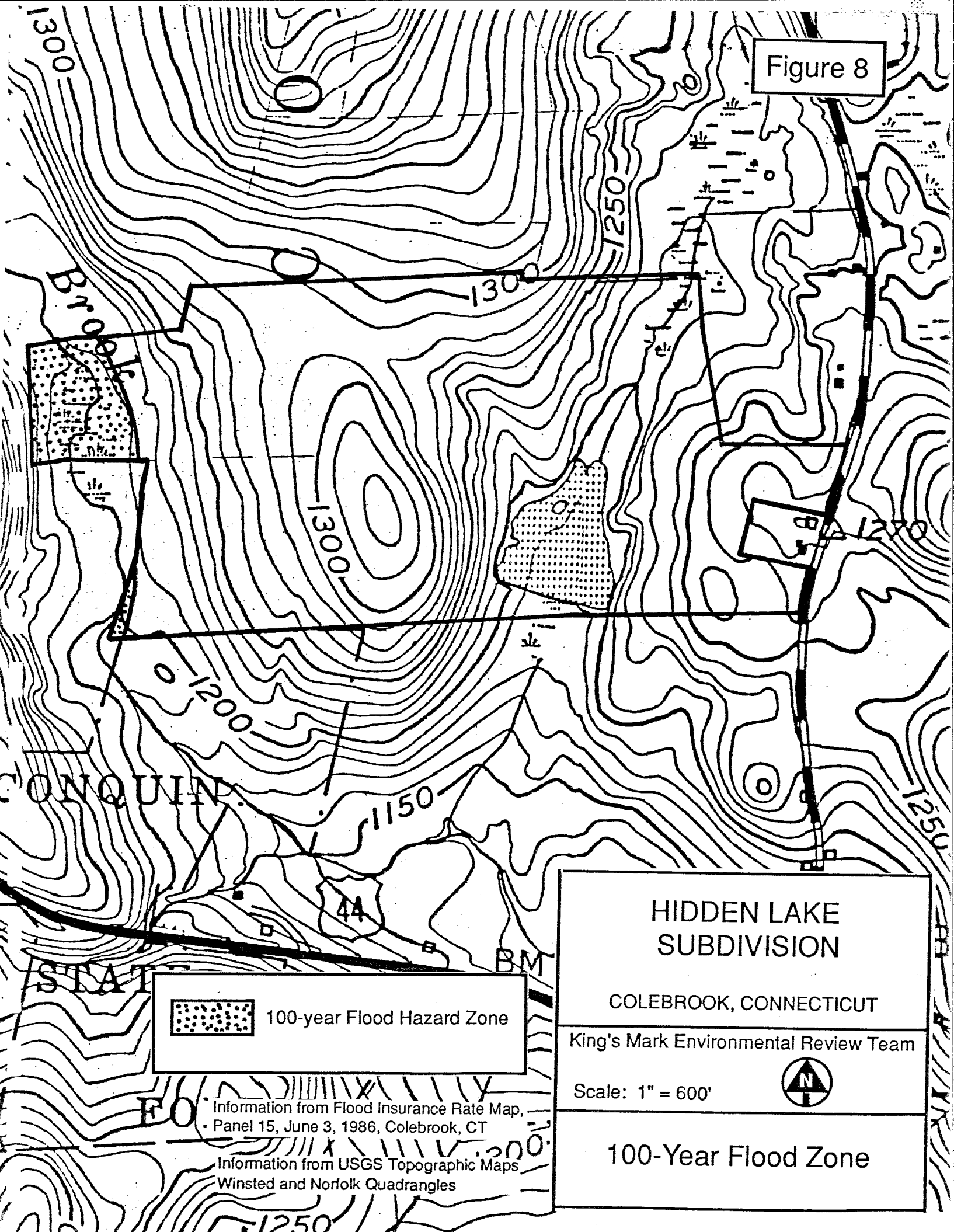


Figure 8
1300
1250
1300
1200
1150
1250
1270
44
HIDDEN LAKE
SUBDIVISION
COLEBROOK, CONNECTICUT
100-year Flood Hazard Zone
King's Mark Environmental Review Team
Scale: 1" = 600'
N
100-Year Flood Zone
Information from Flood Insurance Rate Map,
Panel 15, June 3, 1986, Colebrook, CT
Information from USGS Topographic Maps
Winsted and Norfolk Quadrangles

area of Beaver Pond would increase from 2.9 acres to 4.4 acres in size during a 100-year flood event. This constitutes a sizeable 1.5-acre increase and results in the flooding of surrounding riparian hardwood forest. Damage may be caused to some trees, small mammals may be forced away from the pond's herbaceous edges, and beaver lodges or dams may be damaged during the period of increased water levels.

In conclusion, DTC design plans should be supplemented with specific flood elevation information. This additional information should include:

1) HEC-1 analysis should use 24-hour rainfall input data for computing 100-year flood elevations for pre- and post-development conditions at both road crossings.

   Note: This requirement is not specifically stated in NFIP and Colebrook regulations regarding flooding. However, the community has the right to request this data, provided reasons exist to substantiate the request. Reasons in this case include flood and erosion concerns on downstream properties and at the proposed Forest Road crossing, flooding concerns around Beaver Pond on- and off-site, concerns with the dam's current condition and future maintenance and discrepancies between DTC and SCS spillway and existing flood elevations.

2) Alternative design plans for Forest Road showing flooding resulting from different road crossing designs, such as a larger bridge or lower road overtopped during 100-year flood conditions, should be included.

   A larger culvert and spillway design may be warranted to lower proposed flood elevations, especially for the proposed Forest Road crossing. Also, additional dam safety and hydraulic review is necessary through the DEP Dam Safety Unit (Hartford 566-7245) prior to determining if design plans are adequate.

3) A stormwater management plan is recommended to address post-development runoff to protect soil stability on each lot and water quality in Hidden Lake and Beaver Pond (see Hydrology section).

BIOLOGICAL RESOURCES

Development Impacts

The proposal contains 4 wetland crossings, dam modifications and significant cut and fill activities. Two of the proposed wetland crossings do not present significant adverse impacts to the wetlands. The first of these crossings is located north of Lot 1, just off of Pinney Street and will be crossed by the proposed Forest Road requiring fill to be placed in a small finger of wetlands. The second crossing is located between Lot 10 and designated Open Space D. This watercourse corridor, approximately 80 feet wide, will also be crossed by the proposed Forest Road. There is no indication on the site plans or within the hydraulic report of any proposed structures which will allow for the passage of water during storm events. Some form of structure should be placed at this location to prevent alteration of the present hydrologic character and habit of this watercourse.

The third crossing will cross the wetland and watercourse corridor which connects Beaver Pond on the northern portion of the site to Hidden Lake on the southern portion of the site. This crossing will require approximately 10,000 cubic yards of fill material to be placed directly within the wetlands. The application indicates that a 12x4-foot box culvert, running approximately 110 feet, will be used to pass watercourse flows up to the 100-year storm event. During the field review, the applicant's engineer indicated that the proposed large quantities of fill will maintain the maximum road grades allowed under the Town's Planning and Zoning Regulations. The wetland area which will be filled is a predominantly hemlock forest floodplain associated with the watercourse. This area provides flood storage and wildlife habitat, as well as other functions, and is viewed to be of very good to excellent quality with regard to its ecological character and function. In addition to the loss of this functional wetland area by filling, the crossing will present significant potential for impacts including erosion and sedimentation due to the amount of fill which will be brought in and significant stabilization problems because

of the proposed grades. Due to the size of this crossing, the presence of an existing water body upstream from the crossing and the fact that a permanent Town road will be constructed, Gene Robida,Senior Civil Engineer of the DEP Dam Safety Unit has requested that the applicant submit the proposed plans for permit determination by that unit. Additionally, Senior Environmental Analyst Bob Gilmore has requested that the applicant contact him at 566-7160 to review the application materials to determine if a permit is needed under Connecticut's Water Diversion Act, Connecticut General Statutes, Sections 22a-365 through 22a-378, as amended. Also, the applicant should consider the potential flows which could result if the beaver dam were to breach during a 100-year storm event, and design the Forest Road crossing appropriately.

The major concern with regard to Hidden Lake Road is the significant potential for erosion and sedimentation to Hidden Lake and its outlet stream. Due to the steep slopes, amount of proposed cuts and fills and the nature of the existing soils, stabilization and erosion problems will be nearly unavoidable. The applicant proposes to bring in fill material nearly 1.5 times the amount which is presently contained within the existing dam structure. The proposed slopes on the southern bank of the dam (2:1 or 50% grades) will be extremely difficult to stabilize and may result in sedimentation onto the adjacent property and into the watercourse outletting from Hidden Lake. Additionally, the proposed road cuts west of the dam crossing and the proposed driveways for Lots 21 through 25 present significant potential for erosion problems. The proposed grades for these driveways range from 20% to approximately 35% if significant cuts and fills are not added to the proposed plans. The driveway cuts will increase the risks for erosion and sedimentation into Hidden Lake and its outletting watercourse.

Comments and Recommendations

1) Site plans supplied to Team members prior to the field review do not adequately show all existing drainage swales and neglect to show any of the system of logging roads which are present on the site. In order for the Commissions to have a thorough and complete picture of the site and its features, the applicant should amend the site plans to include all of these missing features. A thorough understanding of the site features will be needed for the Commissions to make a knowledgeable and complete evaluation of all potential alternatives to the proposed plans.

2) Several potential alternatives exist for the major wetland crossing of the proposed Forest Road. Alternatives include seeking a waiver to the Planning and Zoning Commission's maximum grade restrictions to decrease significantly the amount of fill needed for the crossing, using a small timber bridge to span the watercourse rather than the culvert to remove concern regarding the ability of the crossing structure to pass potential high flows and moving the proposed crossing to the south into the path of an existing logging road to eliminate the need for additional clearing of the forested floodplain. Although this last alternative may result in the elimination of Lots 5 and 6, it represents a viable alternative to overcome avoidable environmental impacts.

3) The Wetland Commission should consider establishing a conservation easement/deed restriction along the rear of Lots 31 through 37 adjacent to the Mill Brook corridor. This easement could restrict specific activities within a defined buffer zone of the wetlands and provide greater protection of the wetlands from secondary residential impacts (i.e., clear cutting, etc.).

4) Based on review of the proposed plans and consultation with other staff of the DEP Water Resources Unit, the following list of State Permits will either be required or need to have a permit determination performed.

   a) A Dam Safety Permit for the Hidden Lake Road dam crossing - REQUIRED;

   b) A Dam Safety Permit for the Forest Road wetland crossing, stations 12+0 to 14+0 - PERMIT DETERMINATION; and

   c) A Diversion Permit for the Forest Road wetland crossing, stations 12+0 to 14+0 - PERMIT DETERMINATION.

WILDLIFE CONSIDERATIONS

Description of Area/Habitats

The site proposed for development is 144.91 acres in size. The site contains Hidden Lake and Beaver Pond and their associated wetlands, a brook that flows from Beaver Pond into Hidden Lake and another stream which flows off the hill into the lake. The site also encompasses a section of Mill Brook and a portion of wetlands associated with this brook along the site's western border. The majority of the site is covered by coniferous/hardwood forest, but other sections contain forest openings, old fields, open fields and wetlands associated with open water, beaver flowage and brooks. A section of the Algonquin State Forest lies along the site's southern border.

The proposed subdivision includes 43 lots, ranging in size from 1.86 acres to 3.57 acres. Two roads are proposed to provide access from the development to Pinney Street. Four wetland crossings are proposed, and 12 lots contain wetlands within their boundaries.

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

This site contains a great variety of wildlife habitats. 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. Because habitat diversity is enhanced by the presence of wetlands, brooks and ponds, the site provides good to excellent wildlife habitat.

The site is also desirable and useful to a variety of species of wildlife because it is in an area of light development. Most of the Town of Colebrook is still rural in nature and does not support many high density developments. This increases the value of

the site for species which do not readily adapt of dense development/human disturbance.

A variety of wildlife could be expected to utilize the site to serve all their needs, while many more would find it a place to meet some requirements. Species which could utilize an area such as this for some or all of their requirements might include deer, ruffed grouse, otter, mink, raccoons, foxes, coyotes, hawks, owls, various other birds like pine siskins, grosbeaks, juncos, chickadees and various reptiles and amphibians.

Forest: The forested areas contain stands of hemlock, stands of hemlock mixed with hardwoods and hardwood stands. Species of trees include hemlock, white pine, beech, red maple, sugar maple, black birch, yellow birch, ash and oak, among others. Hemlock regeneration is evident in some places. Areas of the site have been recently logged.

Mature hardwood forested areas provide roosting and nesting places, areas of cover and areas to feed in. Oaks provide acorns for species like deer, squirrel and turkey. Maple seeds, buds and flowers provide food for many kinds of birds including chickadees, evening, pine and rose-breasted grosbeak, goldfinch and purple finch.

The snag trees (dead trees) on the property provide insects for a variety of wildlife including 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. These cavities also provide denning sites for raccoons, etc.

A major portion of the site is covered by conifer stands, composed mainly of hemlock. Most stands contain mature trees, although younger conifer cover is also present. Some areas of hemlock show regeneration and provide cover close to the ground. These conifer stands are important to a variety of wildlife. Species such as red squirrel, derive all of their year-round requirements from conifer stands. An

even greater array of species utilize conifers as an essential or highly desirable habitat component on a year-round or seasonal basis including snowshoe hares, ruffed grouse and a variety of songbirds. Species such as turkey vultures, ruffed grouse, deer, certain raptors and many songbirds use conifers as preferred roosting and/or loafing cover. Mourning doves, goshawks, sharp-shinned hawks and robins may frequently use hemlock stands for nesting. Snowshoe hares and ruffed grouse utilize stands of conifer for cover. Conifer seeds are eaten by crossbills, pine grosbeaks and red squirrels. The foraging activity of predators such as the red fox, weasel and coyote in areas of conifer is often increased during winter months because of the intensified use of these areas by wildlife in general. Small patches of evergreen mixed in with the hardwoods are useful as cover and increase the interspersion of habitat types.

Forested areas (both hardwood and coniferous) provide habitat for many species who might derive all of their needs from this area and for those larger ranging species requiring more space and additional habitat variation. These forested areas provide some habitat in conjunction with the large wetlands nearby, old fields and more large contiguous tracts of unbroken forestland.

Wetlands/Brooks/Ponds: Beaver Pond was created years ago when beaver first moved into the area and dammed the stream. This area in conjunction with the surrounding habitat types provides a variety of food, cover, water, nesting sites and roosting sites for a wide variety of wildlife. Over the years, much of the timber in the Beaver Pond has died. This standing dead timber (or snags) provides insects for birds such as woodpeckers and chickadees, and roosting spots and nesting locations for various birds. The habitat that Beaver Pond offers would be improved if there were more low shrubby cover around the edges and more emergent cover in the impoundment itself, but the area still provides a diverse habitat for a variety of species. There appears to be at least 1 beaver colony using this area at present.

Wildlife such as muskrat, otter, mink, various reptiles (snakes and turtles) and amphibians (salamanders and frogs), along with others, use the Beaver Pond area. A number of birds could utilize this area including tree swallow, black-capped chickadees, brown creeper, downy and hairy woodpecker, white-breasted nuthatch, various hawks, owls, ducks, geese and wading birds like the blue heron, along with many others.

Hidden Lake can be utilized by many species, but is less useful to wildlife in general due to the lack of dead trees, minimal cover in the lake and lack of cover around a good portion of the lake. However, this is a preferred area for geese because the island is ideal for their nests and the grassed in dam and spillway provides grass to feed on. Otter and mink are not expected to forage here for fish. Although not as diverse a habitat area for wildlife as Beaver Pond, Hidden Lake still provides habitat for a variety of species.

Both brooks which flow into Hidden Lake from the north and northwest add to the value of the site for wildlife. In addition to providing a source of water, they provide additional habitat for mammals, reptiles and amphibians. Reptiles and amphibians may spend all or part of their life-cycle here. Because of this, brooks are often used by predators such as raccoons, foxes and mink which sometimes utilize reptiles and amphibians as prey. Many species of wildlife, especially predators, use brook systems to travel along.

The wetlands associated with Mill Brook at the very western boundary of the property contain fairly diverse vegetation including trees such as elm and red maple, shrubs such as alder and winterberry holly and a variety of herbaceous plants and grasses forming tussocks between standing water. This wetland area provides food, cover, water, nesting and roosting places for a variety of wildlife and is an important part of a much larger wetland system. Beaver have occupied this area, but their level of activity at this time is questionable. If not occupied at present, a single beaver or

pair of beaver might utilize the area in the near future. When beaver reach 2 years of age, they are forced from the parent colony and must find territory of their own to occupy. With high population levels, most habitat areas suitable for beaver are occupied.

Forest Openings/Open Fields/Old Fields: Forest openings, open fields and old fields increase the overall habitat diversity of the site for wildlife. Forest openings provide abundant growth of sprouts and seedlings for browse. Insect eating birds utilize these areas, because insect production is higher. The open field area near the dam is maintained by periodic cutting. Various birds requiring grassy cover for nesting can use an area like this, if it is not mowed too early in the spring. The old field areas on the site contain a variety of grasses, herbaceous plants, shrubs such as juniper and blueberry and small trees including black birch, cherry and white pine. Because of this variety, these areas provide an abundant source of food and cover. The old field areas along with the open field areas provide habitat for small mammals like mice and voles. Therefore, these areas are used as hunting grounds for species like hawks, owls, foxes and coyotes.

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. Habitat will be lost where cover is cleared for lawns and landscaping. Another 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 raccoons.

The design of this development which contains medium sized lots (approximately 2-5 acres) will probably augment the negative impacts to wildlife habitat. Larger houselots (10-15 acres) can lessen the impact in some cases.

If possible, consideration should be given to cluster housing. This would reduce the amount of land developed and, if done in conjunction with reducing the wetland crossings, would lessen the impact on wildlife habitat.

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 preserve and set aside as open space if possible. 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 should be avoided or limited whenever possible. A buffer of at least 100 feet is recommended around any wetland to preserve their value and use by wildlife.

If wetlands must be crossed, large box culverts are preferred to round aluminum or cement culverts. Most species of wildlife using brooks and wetlands to travel along will not be greatly impeded by a large box culvert through which they can see daylight. A small round or squash culvert represents a small, usually dark and restricted area that the animal will have to enter. In this situation, some species might prefer to cross up and over the road.

Also, box culverts are less prone to being dammed by beaver because they are not a convenient restriction point. If beaver continue to inhabit the site, they might try to dam the box culvert proposed below Beaver Pond.

Beaver are expected to remain in Beaver Pond as long as a suitable food source is present (see Appendix B). They will continue to take down trees all around the border of the pond until all suitable trees are gone. Although the habitat for beaver is

less desirable in Hidden Lake, 2-year-old beaver from Beaver Pond may be forced to move down into Hidden Lake to accommodate population expansion. If this happens, they might try to block up both the control structure and the emergency spillway. Population management through the use of the regulated beaver trapping season to lower the population levels would lessen these types of problems. However, reoccupation will always be possible, providing there is a suitable water source, trees for food and the current tendency for the population to expand.

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.

Open Space Areas: Whatever type or combination of types of areas are set aside, whether wetlands or forestland, setting aside an "island of open space" surrounded by development is the least desirable for wildlife. The open space 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. Setting aside a combination of habitat types in conjunction with wetlands is desirable.

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.

Development Recommendations: 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 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, 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, for 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 that produce fruit which persists through the winter (winterberry). See Appendix C for a list of suggested 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 more remains to be utilized for wildlife habitat.

THREATENED AND ENDANGERED PLANT AND ANIMAL SPECIES

According to the Natural Diversity Data Base, there are no Federal Endangered and Threatened Species or Connecticut "Species of Special Concern" that occur 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 Geological and Natural History Survey and cooperating units of DEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultation with the Data Base should not be substituted for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as enhance existing data. New information is incorporated into the Data Base as it becomes available.

LAND USE AND PLANNING CONSIDERATIONS

PLANNING CONSIDERATIONS

Compatibility of Proposed Project with Surrounding Land Uses

The Hidden Lake Subdivision site is located within a rural residence zone with minimum lot size of 80,000 square feet (approximately 2 acres). The land surrounding the site is also zoned for rural residential development. With the exception of a few residences on Pinney Street, land use in the vicinity of the site consists of undeveloped woodland and wetland. A portion of the Algonquin State Forest abuts the southwestern corner of the property.

The proposed subdivision includes 43 lots on the 145-acre site and represents an intensity of development considerably greater than the existing development pattern which has evolved in the Town of Colebrook. Although the individual lots are consistent with zoning for the area, there is very little meaningful open space provided under the proposed plans. This gives the project the appearance of a "concentrated, suburban-type development." The project would be more consistent with the development pattern of Colebrook if more open space was provided.

Consistency of Project with State, Regional and Local Plans

The State Policies Plan for the Conservation and Development of Connecticut, 1987-1992 is a statement of the growth, resource management and public investment policies of the State. The Plan was prepared by the Office of Policy and Management (OPM) and adopted by the Connecticut General Assembly in 1987. The objective of the Plan is to give a balanced response to human, environmental and economic needs in a manner which best suits the future of Connecticut. Regional planning organizations in the State have been encouraged by OPM to foster implementation of the Plan at the local level.

According to the Locational Guide Map which accompanies the State Plan, the majority of the site has been classified as "rural land." The State action strategy for

rural land is "Avoiding support of structural development forms and intensities which exceed on-site carrying capacity of water supply 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 Mill Brook is classified as a conservation area according to the State Plan. The state action strategy for conservation areas is to "plan and manage for the long term public benefit the lands contributing to the state's need for food, fiber, water and other resources, open space, recreation and environmental quality, and insure that changes in use are compatible with the identified conservation values."

The proposed development of the site would be more compatible with the goals and objectives of the State Plan if greater attention were given to protecting the rural character and conservation values of the site.

The Litchfield Hills Council of Elected Officials (LHCEO) is the official regional planning organization for the Litchfield Hills Region which includes the Town of Colebrook. The LHCEO recently adopted 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 could be modified to better reflect each of these objectives.

The Town of Colebrook does not have a Town Plan of Development. However, the proposed project is consistent with the density of development allowed by the comprehensive plan of the Town as expressed through its Zoning Regulations.

Design Considerations

Based on a preliminary review of the proposed plan for Hidden Lake Subdivision dated 10/28/88, the following comments on subdivision design are offered for consideration.

1) Consider the establishment of a streambelt/open space corridor along the western border of the property. This corridor would protect the water quality and other values of the Mill Brook streambelt and provide an open space corridor for passive recreation use (hiking, bird watching, nature study). Passive recreational opportunities along the corridor are significantly enhanced by the abutting land at the Algonquin State Forest. The proposed open space corridor connection between the site and State Forest could be extended north along Mill Brook in time with the cooperation of other property owners. A non-wetland band of land (25-50-foot minimum) should accompany any streambelt corridor dedication to facilitate the development of a recreational trail along the corridor. The streambelt corridor could be permanently protected through the use of a conservation easement on the land or gifting the land to the local land conservancy.

2) The eastern half of the property is particularly attractive with the 2 ponds (and associated streambelt corridor), rolling topography, stone walls and diverse vegetation. Without careful site planning, this rural character can be easily destroyed. Consideration should be given to clustering the 10 units proposed east of the ponds to protect the open space value of this area. Specific provisions for cluster development are found in Section 12 of Colebrook's Zoning Regulations.

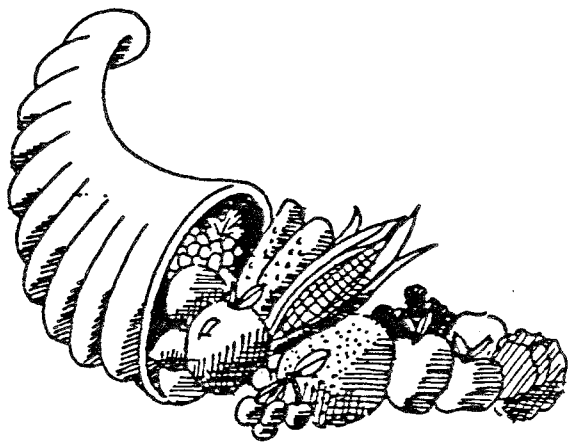
3) The sight line distances where the proposed new roads intersect with Pinney Street should be documented by the applicant to ensure that the distances are adequate for safe access to and from the site.

4) For the lots where driveways will have a grade in excess of 15%, the Commission should consider requiring a driveway drainage plan prepared by a professional engineer.

5) Protection of the streambelt corridor associated with the 2 ponds on the site should be considered, possibly through the use of a conservation easement.

6) Consideration should be given to redesigning the lot layout west of the ponds to better protect the rural character of the landscape. This could be accomplished by reducing the number of lots proposed for this area or clustering the units as provided for under Section 12 of the Zoning Regulations for the Town of Colebrook.

APPENDICIES



Appendix A: Soil Limitations Chart

TABLE 1: Soil Symbols and Mapping Unit Names

Soil Symbol	Soil Mapping Unit Name
ChB	Charlton stony fine sandy loam, 3-8% slopes
CrC	Charlton very stony fine sandy loam, 3-15% slopes
CrD	Charlton very stony fine sandy loam, 15-35% slopes
HxC	Hollis extremely rocky fine sandy loam, 3-15% slopes
Le	Leicester stony fine sandy loam
Lg	Leicester, Ridgebury and Whitman very stony fine sandy loam
PeC	Paxton stony fine sandy loam, 3-15% slopes

TABLE 2: Soil Characteristics Important to Development

Soil Symbol	Permeability (in/hr)	K	Corrosivity to Steel	Corrosivity to Conc.	Flooding	Water Table Depth (ft.)	Water Table Kind	High Water Months	Depth to Rock (in.)	Frost Action
ChB	0.6-6.0	0.20	low	high	none	>6.0	---	---	>60	low
CrC	0.6-6.0	0.20	low	high	none	>6.0	---	---	>60	low
CrD	0.6-6.0	0.20	low	high	none	>6.0	---	---	>60	low
HxC	0.6-6.0	0.17	low	high	none	>6.0	---	---	>60	mod
Le	0.6-6.0	0.20	low	high	none	0-1.5	apparent	Nov-May	>60	high
Lg	0.6-6.0	0.20	low	high	none	0-1.5	apparent	Nov-May	>60	high
PeC	0.6-6.0	0.20	low	mod	none	1.5-2.5	perched	Feb-Apr	>60	mod

K-Erodibility Factor
.10 -.24 - Low Erodibility
.28 - .37 - Medium Erodibility
.43 - .64 - High Erodibility

Flooding Classes
None
Occasional
Common
Frequent

---no data available

TABLE 3: Major Soil Limitations for Development

Soil Symbol	Septic Systems	Excavations	Dwellings	Basements	Commercial	Roads	Lawns	Fill	Ponds
ChB	A	A	A	A	B-9	A	B-16	A	C-11
CrC	B-9	B-9	B-9	B-9	C-9	B-9	B-16,9	A	C-11
CrD	C-9	C-9	C-9	C-9	C-9	C-9	C-9	C-9	C-11
HxC	C-15	C-15	C-15	C-15	C-9,15	C-15	C-15	C-23,15	C-11
Le	C-2	C-2	C-2	C-2	C-2	C-2,8	C-2	C-2	B-18
Lg	C-2	C-2	C-2	C-2	C-2	C-2,8	C-2	C-2	B-18
PeC	C-6	B-13,2,9	B-2,9	B-2,9	C-9	B-2,9,8	B-16,9	A	C-11

Degree of Limitation:
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 possible increased maintenance are required.

Types of Limitations:

1 Seepage	2 Wetness	3 Poor Filtration	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 Lrg.Stone	17 Sm.Stones	18 Slow Refill	19 Piping	20 Dam Seepage
21 Erosion	22 Droughty	23 Area Reclaim		

Appendix B: Wildlife Bureau Information Series on Beaver

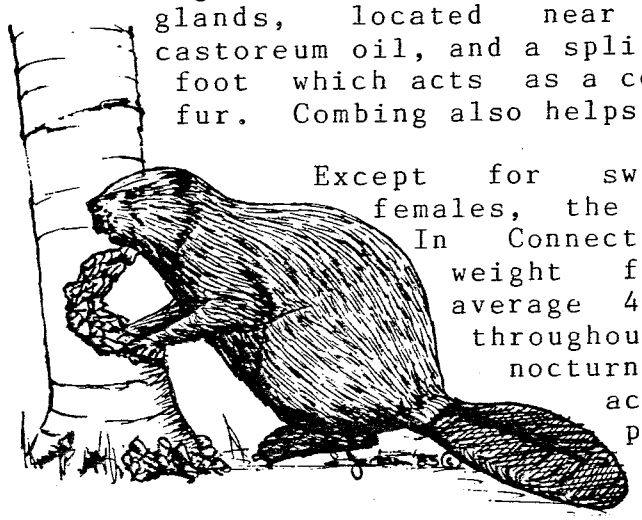
STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
WILDLIFE BUREAU

INFORMATIONAL SERIES

BEAVER

General

The beaver (Castor canadensis) is the largest rodent found in Connecticut, as well as throughout North America. Inhabiting a semi-aquatic environment, the beaver is well equipped for survival--with short ears, webbed feet, rich brown fur (which acts like a wet suit), along with a unique, paddle-shaped, scaled, hairless tail. The tail is slapped on the water as a signalling device to warn other beavers, used as a prop when standing, and as a rudder when swimming. When underwater, thin membranes protect the beaver's eyes, internal valves automatically close within the ears and nose, and the lips seal tightly around the continuously-growing incisors--an adaptation for feeding underwater. The beaver has a pair of large scent glands, located near the anus, which produce castoreum oil, and a split, second toenail on each hind foot which acts as a comb to spread the oil over the fur. Combing also helps remove insect parasites.



Except for swollen mammaries on nursing females, the sexes are indistinguishable. In Connecticut, adult beavers range in weight from 30 - 65 pounds and average 45 pounds. They are active throughout the year, and are often nocturnal. Adults concentrate their activity in the vicinity of a permanent lodge and surrounding habitat.

Biology and Habitat

Beavers are monogamous, having only one mate during the breeding season, and often for life. Breeding occurs in midwinter and, after a gestation period of 100 - 110 days, a single litter of two to five precocial kits is born. Kits are well furred at

birth, with teeth already cut--exact miniatures of the adults. Until they are two years old, the young remain with the adults as a family group or colony. Beavers are sexually mature at age two, but seldom breed until their third year. The adults drive the two-year-olds out of their territory, forcing them to migrate and search for mates and unoccupied areas to establish new colonies. Territorial by nature, they will not tolerate other beavers within their colony's home area. A typical colony in midwinter may include the adult pair, two to four kits from the previous spring's litter, two or three yearlings and one or more two-and-a-half-year-olds. Established colonies are occasionally forced to move if their food supply is depleted, but this may take 10 or more years.

Beavers forage on the bark and twigs of trees such as aspen, willow, birch, maple, apple, alder, cherry, pine, and poplar. In summer their diet is supplemented with aquatic vegetation such as water lilies, pond weeds, and cattails. Often traveling 100 yards or more from their home, beavers will seek a corn, or other crop field, chew the plants off at ground level, and drag the entire stalks back to their lodge. Remaining herbaceous and woody vegetation is often used as construction material in their dams. During the fall, the beaver collects a cache of branches and twigs which provide food throughout the winter when the pond ices-over.

Good beaver habitat is found almost any place there is a year-round source of water, such as streams, lakes, farm ponds, swamps, and wetland areas. Unparalleled at dam building, these aquatic furbearers can build on fast-moving streams as well as slow-moving ones. Depending on the situation, beavers construct bank dens or lodges, and sometimes both; each has two to four entrances. In winter, mud is packed on the inside; once frozen, it provides a barrier from predation. Lodges and bank dens are used primarily for raising young, sleeping, and storing food during severe winters.

Benefits

Although beavers have become a nuisance in many parts of their range, causing considerable damage, the benefits of their existence should not go unnoticed. Some of their valuable characteristics include the following:

1. Adult beavers, as well as kits, provide a source of prey for bobcats and coyotes.

2. Wetlands created by beavers have, to a large extent, increased the availability of wood duck breeding areas by providing dead trees for these and other cavity-nesting birds. Ponds also aid in conserving water, reducing erosion, retarding forest succession, and creating new habitats for aquatic fish and wildlife other than birds.

3. Credited with influencing the rapid settlement of some parts of North America, the European demand for beaver pelt hats and fur clothing kept trappers moving westward. Pelts are prime during the winter months, when the fur is thickest and most valuable. Today, beaver pelts are used for making coats and accessory garments, while the meat is considered a delicacy, readily consumed by those who harvest it.

Problems

The declining fur market demand for beavers, and consequent reduction in beaver pelt value in recent years, has forced many experienced trappers to abandon or shift priorities in their trap lines. In the absence of trapping or predators, beaver colonies would likely expand throughout most watersheds. Simply removing a nuisance beaver will not alleviate the problem as migrating two year-olds will find the removal sites quickly and reoccupy them.

Management of Nuisances

Most of the damage caused by beavers is the result of dam building, bank burrowing, tree cutting, or flooding. Such damage is not only economically significant, but it is also frustrating for landowners and others who utilize the affected areas. Beaver damage totals an estimated 75 to over $100 million per year nationwide.

SJ

Listed below are several recommended control methods:

1. Trapping and Dam Removal--Beaver population control is best achieved through regulated fur trapping. Once the animals are removed, the dam and construction materials should be eliminated. Trappers may be reluctant to trap outside of the regulated season (usually December through February), as pelts are not prime and their value is markedly decreased.

   Due to an overabundance of beavers throughout Connecticut, live-trapping will only postpone a nuisance problem and/or spread the problem to the new release site. Once beavers have been trapped-out, it is usually necessary to regulate the local population level through subsequent trapping efforts.

Dam removal alone is usually not enough to discourage beavers, but repetitive destruction of the dam and lodge may deter them temporarily.

2. Water Control Devices--Beaver pipes and/or wire culvert pipes have been used with some success to control dam-induced flooding. Listed below are four of the better, simpler water level controls. The Wildlife Bureau is always open to ideas for maintenance-free mechanisms to control water levels at beaver dams.

   a) Wire mesh culvert--this basically requires creating an opening in the beaver dam and inserting a 10-foot-long by 2 1/2-foot-wide wire mesh culvert. (For more information see Roblee reference.)

   b) Corrugated, perforated, plastic drainage--this will work fine for small drainages.

   c) Culvert with wire mesh covering the end--this type of water control device requires daily inspection and possible cleaning.

   d) Culvert with board--replacing the wire mesh of suggestion c) with a piece of 1/2-inch plywood works well in controlling the water level. This device requires daily removal of the board to allow for drainage.

References for Further Reading

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Appendix C: Suitable Planting Materials for Wildlife Food and Cover

SUITABLE PLANTING MATERIALS FOR WILDLIFE FOOD AND COVER

Herbaceous/Vines	Shrubs	Small Trees
Panicgrass	Sumac	Hawthorn
Timothy	Dogwood	Cherry
Trumpet creeper	Elderberry	Serviceberry
Grape	Winterberry	Cedar
Birdsfoot trefoil	Autumn olive	Crabapple
Virginia creeper	Blackberry	
Switchgrass	Raspberry	
Lespedeza	Honeysuckle	
Bittersweet	Cranberrybush	
Boston Ivy		

NOTES

ABOUT THE TEAM

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