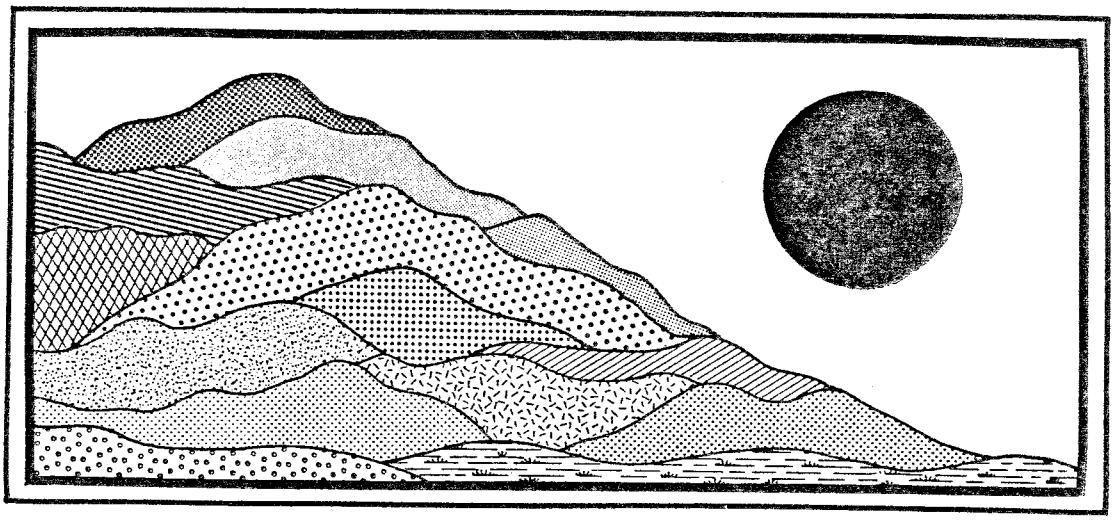
The Ridge

East Granby, Connecticut

November 1986



ENVIRONMENTAL REVIEW TEAM REPORT

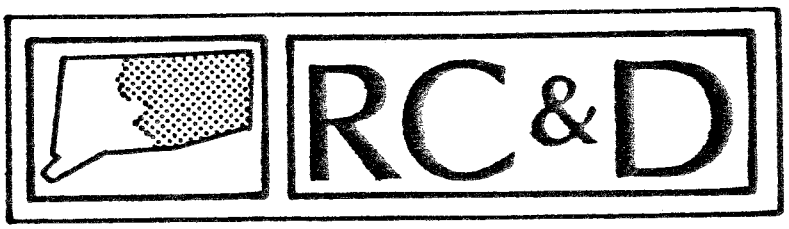
EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

The Ridge

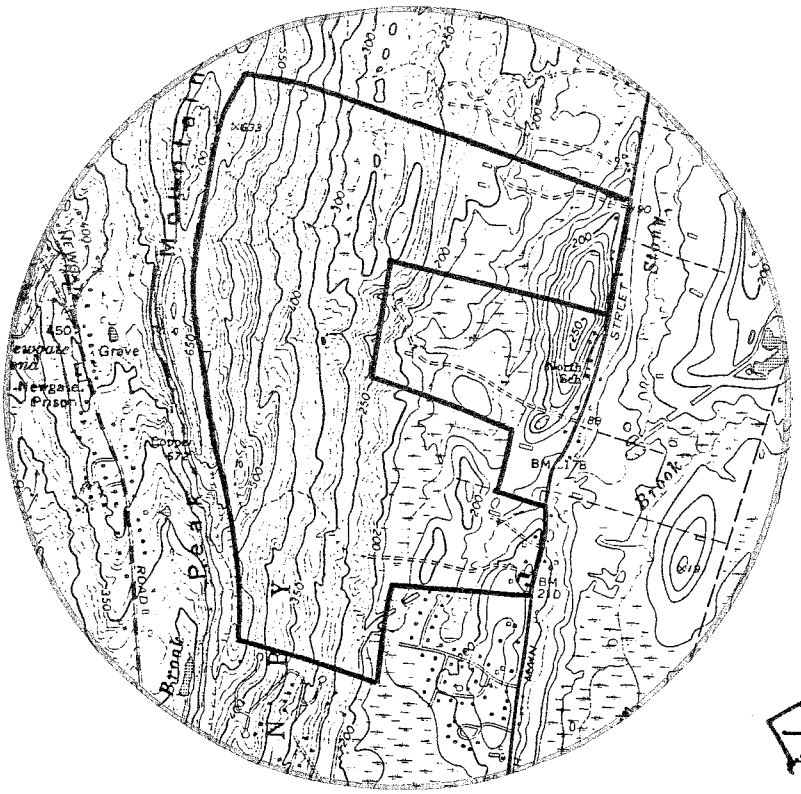
East Granby, Connecticut

Review Date: *OCTOBER 20, 1986*

Report Date: *NOVEMBER, 1986*



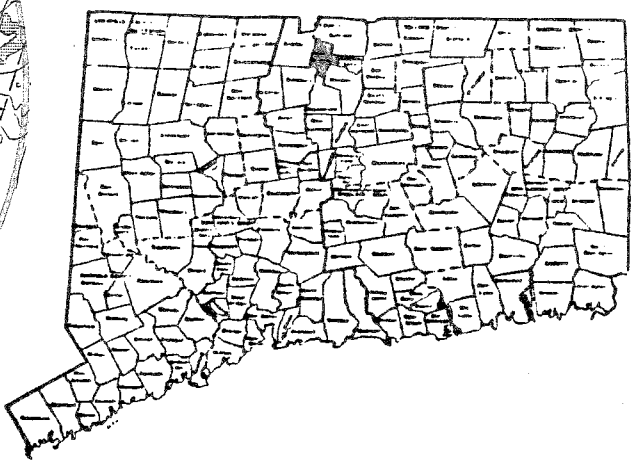
ENVIRONMENTAL REVIEW TEAM
PO BOX 198
BROOKLYN, CONNECTICUT 06234

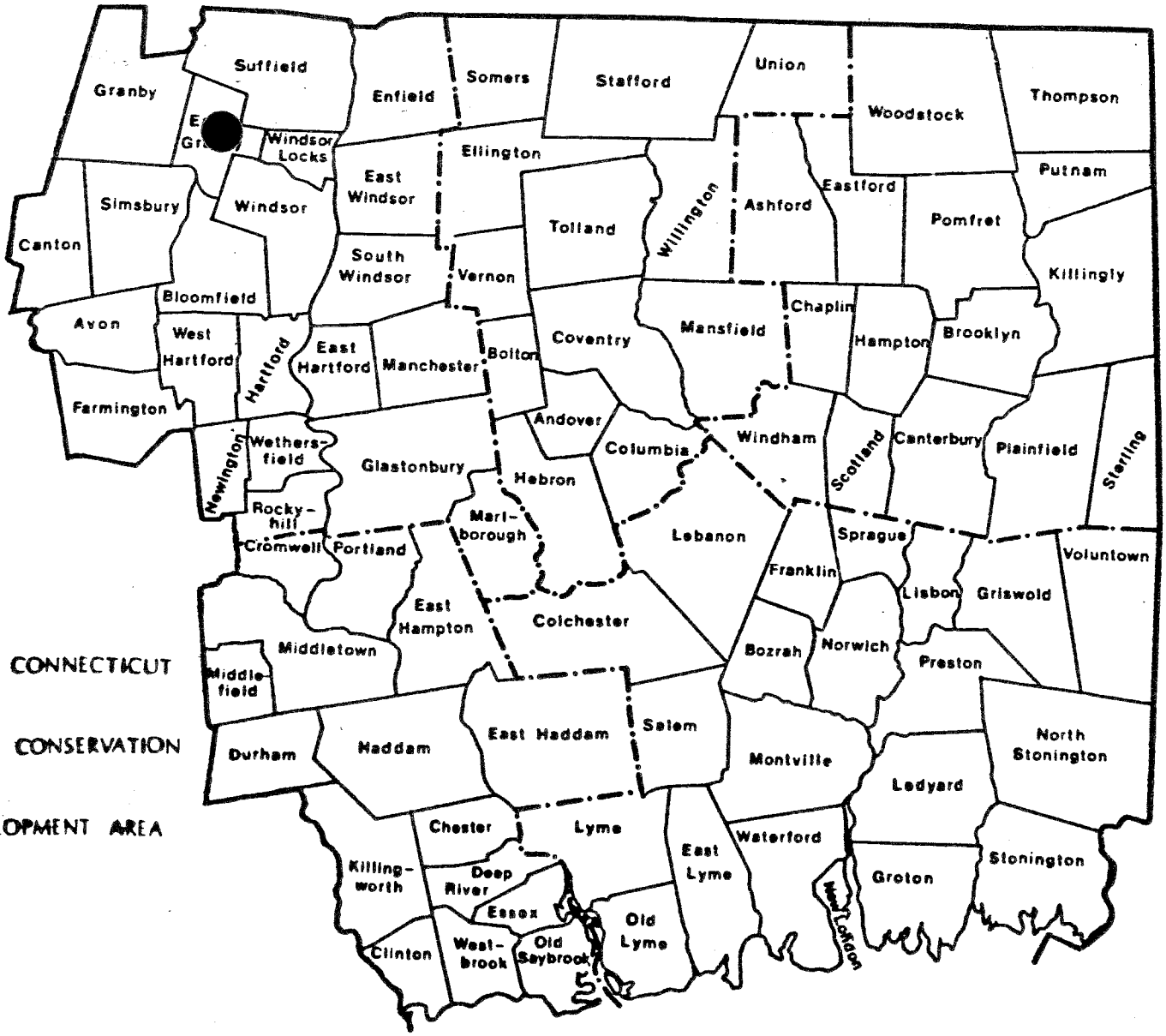


Site Location

THE RIDGE

EAST GRANBY, CONNECTICUT





EASTERN CONNECTICUT

RESOURCE CONSERVATION

& DEVELOPMENT AREA

ENVIRONMENTAL REVIEW TEAM REPORT

ON

THE RIDGE

EAST GRANBY, CONNECTICUT

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

The ERT met and field checked the site on Monday, October 20, 1986. Team members participating on this review included:

Vern Anderson	*--District Conservationist - U.S.D.A., Soil Conservation Service*
Tim Barry	*--Fisheries Biologist - DEP, Western District*
Joe Hickey	*--State Park Planner - DEP, Parks and Recreation*
Kip Kolesinkas	*--Soil Scientist - U.S.D.A., Soil Conservation Service*
Art Mercuri	*--Senior Sanitary Engineer - DEP, Water Supplies Section*
Ken Metzler	*--Botanist - DEP, Natural Resources Center*
Joe Pulaski	*--Environmental Analyst - DEP, Noise Control*
Paul Rothbart	*--Wildlife Biologist - DEP, Western District*
Larry Rousseau	*--Forester - DEP, Bureau of Forestry*
Elaine Sych	*--ERT Coordinator - Eastern Connecticut RC&D Area*
Bill Warzecha	*--Geologist - DEP, Natural Resources Center*
Mike Wozniak	*--Community Development Planner - Capitol Region Council of Governments*

Prior to the review day, each Team member received a summary of the proposed project, a list of the Town's concerns, a location map, a topographic map and a soils map. During the field review the Team members were given preliminary plans. The Team met with, and were accompanied by a representative of the developer, the Town planning consultant, engineer and the chairman of the Planning and Zoning Commission. Following the review, reports from each Team member were submitted to the ERT Coordinator for compilation and editing into this final report.

This report represents the Team's findings. It is not meant to compete with private consultants by providing site designs or detailed solutions to development problems. The Team does not recommend what final action should be taken on the proposed project--all final decisions and conclusions rest with the Town and landowner. This report identifies the existing resource base and evaluates its significance to the proposed development and also suggests considerations that should be of concern to the developer and the Town.

The results of this Team action are oriented toward the development of better environmental quality and the long-term economics of land use.

The Eastern Connecticut RC&D Executive Committee hopes you will find this report of value and assistance in making your decisions on this proposed planned residential development.

If you require any additional information, please contact:

Elaine A. Sych
ERT Coordinator
Eastern Connecticut RC&D Area
P. O. Box 198
Brooklyn, CT 06234
(203) 774-1253

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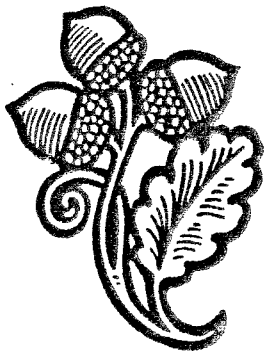
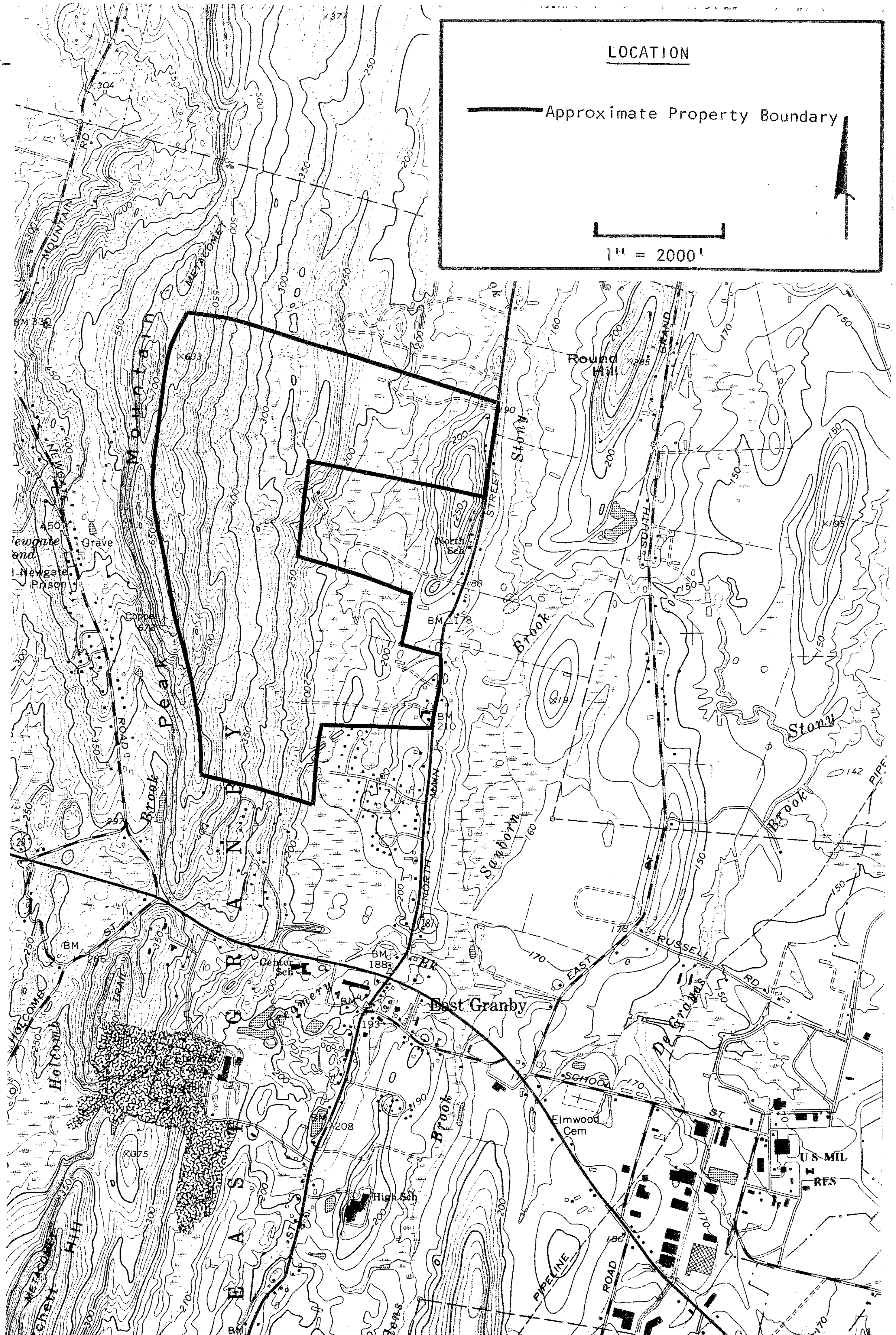


1. INTRODUCTION

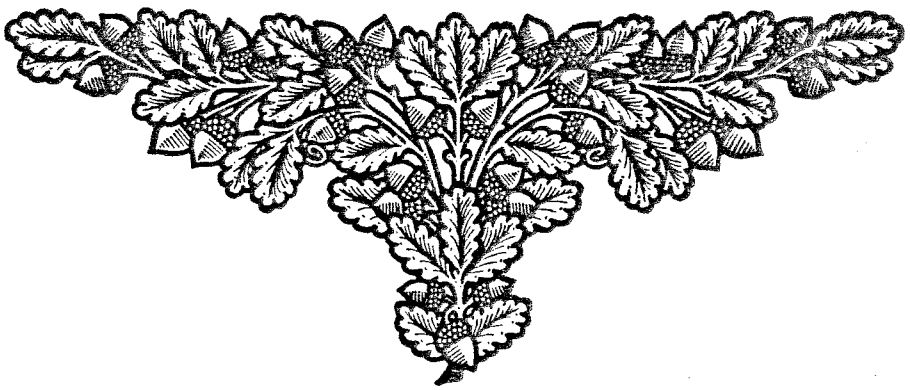
The Eastern Connecticut Environmental Review Team was asked to assist the East Granby Planning and Zoning Commission in reviewing "The Ridge", a planned residential development. This report contains a natural resource inventory of the site, as well as an evaluation of the existing resource base and its significance to the proposed development. This report also highlights areas of concern and potential problems and makes recommendations to the Town and developer.

A preliminary plan has been submitted by the Derekseth Corporation, they are the developers for the project, and Ed Lally and Associates are the project engineers.

"The Ridge" subdivision site is a large tract of land situated north of East Granby Center. It is located between Peak Mountain, a traprock ridge (see Geology Section) and North Main Street (Route 187). Total acreage of the parcel is ± 820 acres. According to present plans the entire site is proposed for residential development. The proposal calls for building 289 houses (Type number 1) on three quarter (3/4) to five (5) acre lots and 229 houses (Type number 2) on one quarter (1/4) to three quarter (3/4) acre lots, for a total of 518 new homes. These are single family-detached residential units. Development also involves constructing 41,000 linear feet of public roads, 1,600 linear feet of public drives and 19,000 linear feet of private drives. Also proposed are various amenities such as a 9-hole golf course, baseball and soccer fields, a pool, tennis courts and nature trails.


LOCATION
Approximate Property Boundary
1" = 2000'
Mountain
Peak
Metacomet
Round Hill
Stony Brook
Sanborn Brook
North Sch
Newgate Prison
Newgate Pond
Grave
Copper
Center Sch
East Granby
Elmwood Cem
High Sch
Holcomb
U S MIL RES
SCHOOL ST
RUSSELL RD
SOUTH GRAND ST
NORTH MAIN ST
NORTH STREET
NEWGATE RD
MOUNTAIN RD
PIPELINE ROAD
EAST GRANBY

2. TOPOGRAPHY AND SETTING



The parcel of land is located in the physiographic region of Connecticut known as the Central Lowlands or the Connecticut Valley. One of most outstanding geologic features of this region are the traprock ridges, which bisect the State in a north/south direction. In Connecticut, the traprock ridges have steep west facing scarps (cliffs formed by faulting), more gentle eastern slopes and relatively flat-topped summits which afford visitors spectacular views, especially to the west.

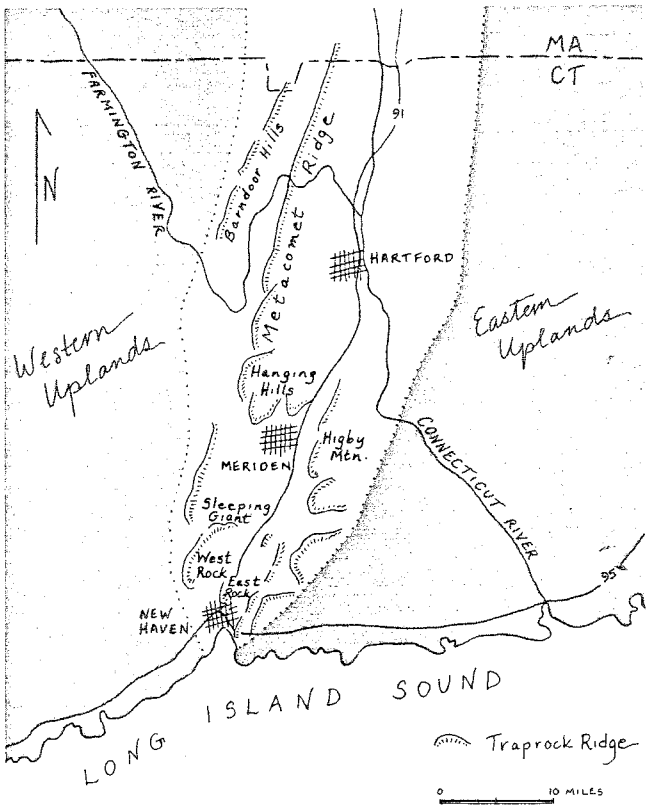
The subject parcel is located on the eastern slope of the traprock ridge known as Peak Mountain. The western half of the parcel is characterized by moderate areas to areas of very steep slopes. More gentle slopes characterize the central and eastern parts of the parcel.

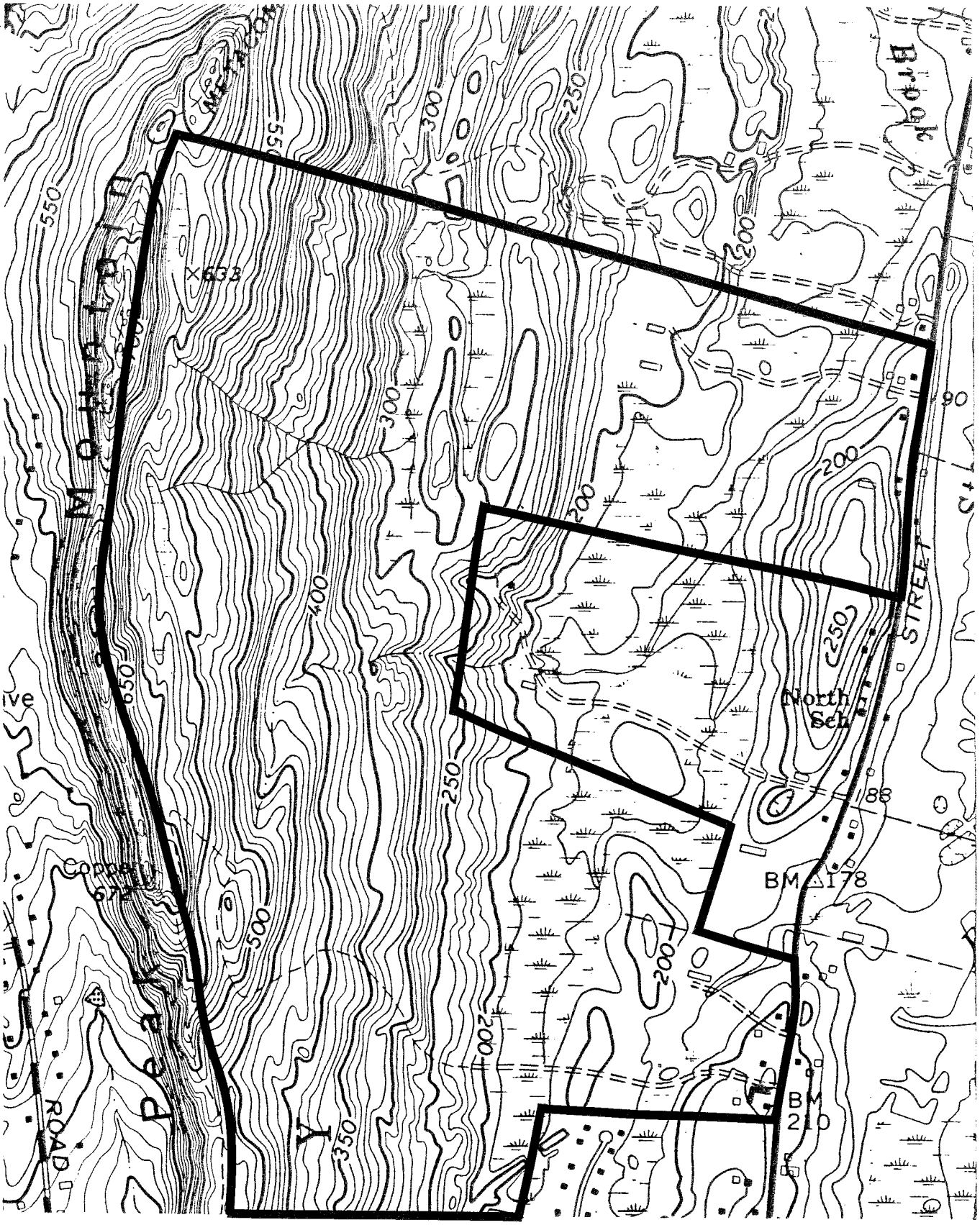
The western half of the site is dominated by mixed hardwood and softwood forest, while the eastern half is comprised of numerous open fields which were used for agricultural purposes.

Several farm roads and/or logging roads extend into the western parts of the property from Route 187 or North Main Street.

The major streamcourse on the site is a north flowing tributary to Austin Brook, which is located in the central parts. Regulated inland wetland soils generally parallel this streamcourse in a relatively broad, flat valley.

Maximum and minimum elevations on the site are about 700 feet and 190 feet above mean sea level.



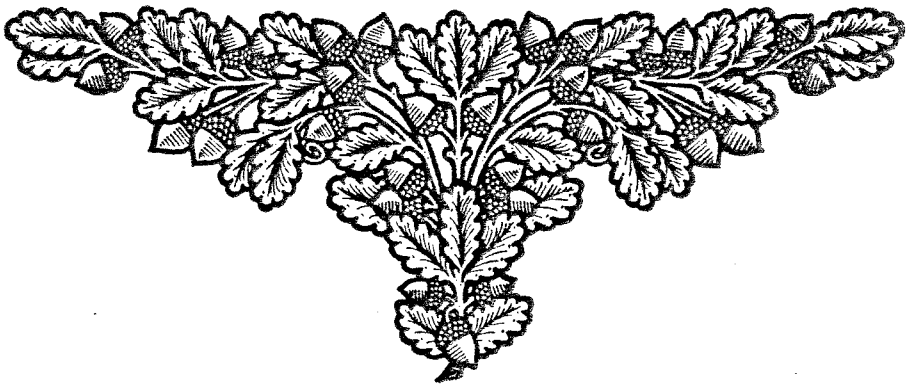


TOPOGRAPHY

Approximate Property Line

1" = 1000'

3. GEOLOGY



The proposed residential development is located within the Windsor Locks topographic quadrangle. A bedrock geologic map (GQ-388 by R. H. Schnabel and J. H. Eric) and a surficial geologic map (GQ-137, by R. B. Colton) for the quadrangle have been published by the U. S. Geological Survey.

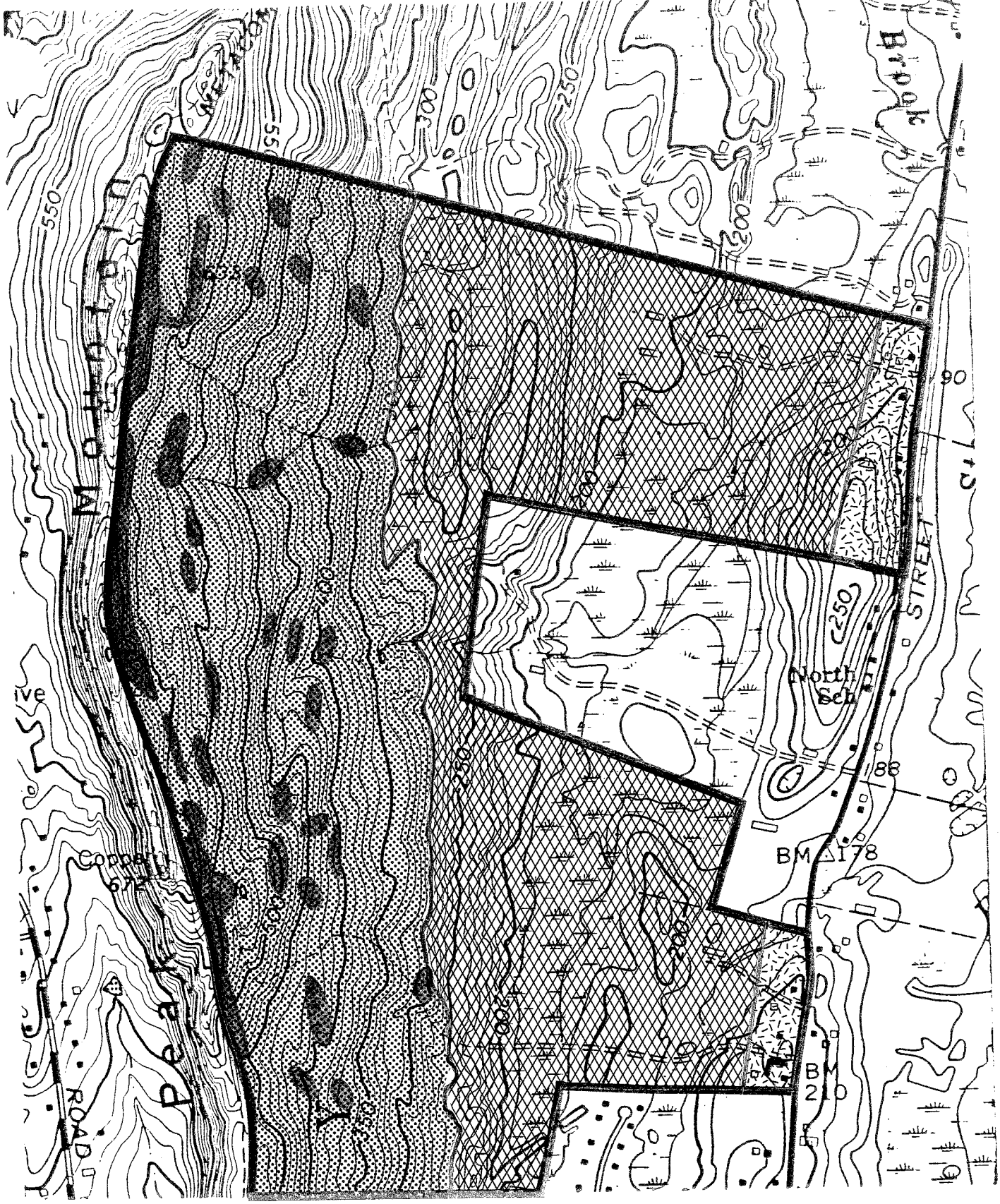
A. BEDROCK GEOLOGY:

Schnabel and Eric (1964) identify three (3) types of rocks underlying the site. All three (3) formed as a result of volcanism and erosion during the middle to late Triassic period, approximately 200 million years ago. They include the East Berlin Formation, Holyoke Basalt and Hampden Basalt. The latter two (2) formed from lava, which outpoured from volcanoes onto the Connecticut Valley floor.

The Holyoke Basalt underlies the western parts of the site. It consists of a volcanic rock rich in iron and magnesium bearing minerals, as well as calcic plagioclase. Gas bubbles were trapped in the solidifying lava, giving the basalt cavities which are known as vesicles. Some of the cavities were later filled by secondary minerals, such as calcite, prehnite, zeolite and quartz. The filled cavities are known as amygdules. Out of the three (3) lava flows that occurred in the Connecticut Valley, the Holyoke Basalt was the most massive sheet. It is estimated to be between 450 and 500 feet thick.

The second basaltic rock found on the site is the Hampden Basalt. (NOTE: A third lava flow called 'Talcott Basalt' underlies but does not surface within the site.) Hampden Basalt generally parallels Route 187 as a thin band. Schnabel and Eric (1964) describe the Hampden Basalt as a medium to fine grained, medium dark gray to dark greenish-gray volcanic rock composed of minerals similar to the Holyoke Basalt. The Hampden Basalt represents the most recent lava flow and the thinnest. The term "basalt" refers to a fine-grained rock, which is cooled very fast and has a glassy texture. "Basalts" are commonly called traprock, an engineering term given to crushed "basaltic" rock. It is used in construction for road base material and rip-rap.

Lying between the two (2) basaltic formations on this site is a sedimentary rock (rocks formed by the deposition and cementation of eroded material derived from volcanic, metamorphic or other sedimentary rock) called the East Berlin Formation. The rock comprising this formation, consists of thinly bedded, medium-gray to reddish brown arkosic siltstone. The term "arkosic" refers to the sedimentary mineralogy of the rocks; they contain high percentages of feldspar and quartz. The rocks were formed by the cementation of silt-sized particles which were deposited in streams and lakes on top of the Holyoke Basalt formation mentioned earlier. Following their formation, they were covered by the thin Hampden basaltic flow and also another sedimentary rock called Portland Arkose. (see Geologic Cross Section.) Following this volcanic activity and formation of sedimentary rocks in the Connecticut Valley, the whole region was faulted and tilted to the east about 15-25°. Differential erosion ate away most of the



BEDROCK GEOLOGY

Holyoke Basalt
East Berlin Formation
Hampden Basalt
Rock Outcrops

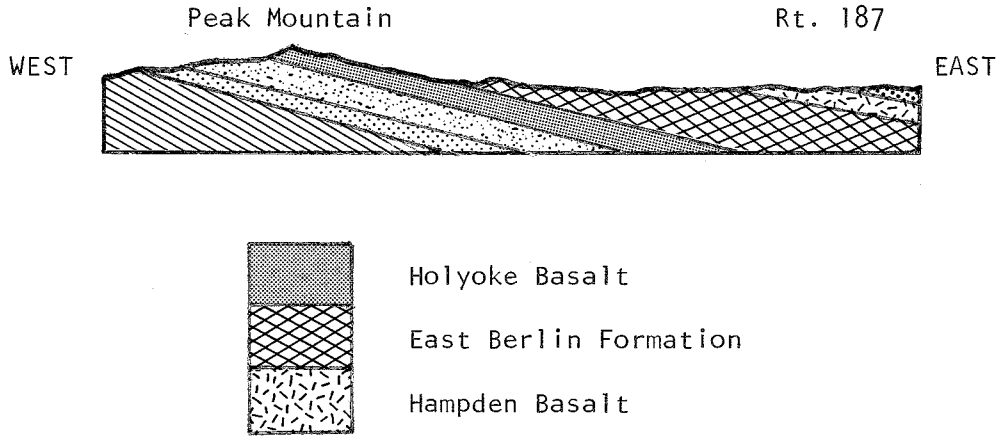
1" = 1000'

*Also see Geologic Cross Section of the Site

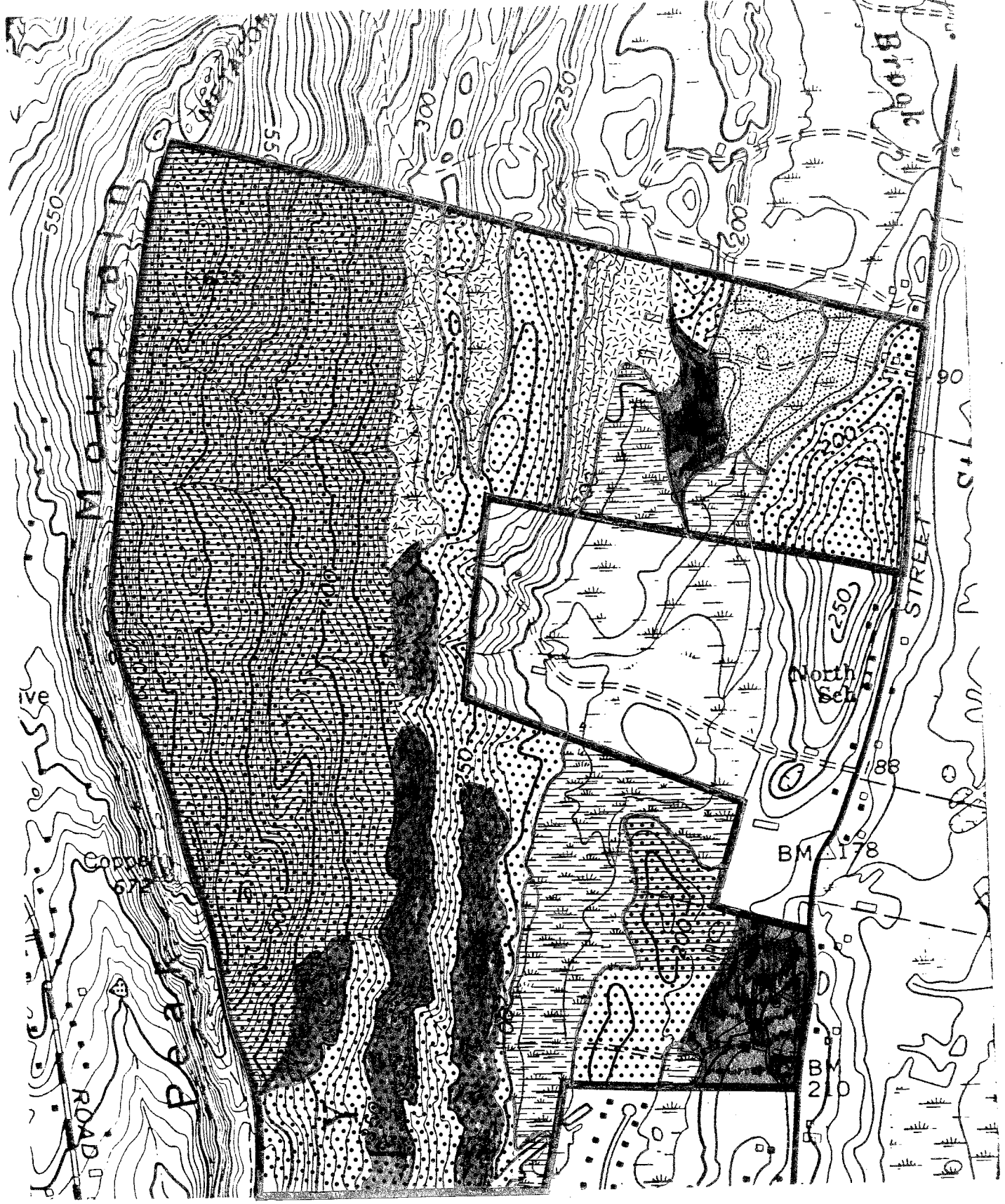
relatively weak sedimentary bedrock of the Connecticut Valley, but the dense resistant basalt eroded much more slowly leaving the traprock layers as long ridgebacks standing out far above the surrounding landscape.

Bedrock outcrops and thinly veneered bedrock characterize the western parts of the site. Several bedrock outcrops, flush with the ground surface, are visible on the rounded knolls in the eastern parts of the site.

GEOLOGIC CROSS SECTION OF "THE RIDGE"



NOTE: *At least two other sedimentary units and one other lava flow underlie the central and western portions of the site. The two sedimentary units are called New Haven Arkose, the oldest of all units laid down in the Connecticut Valley and the Shuttle Meadow Formation. The other lava flow is referred to as Talcott Basalt.*



SURFICIAL GEOLOGY

Till

Till (Thin)

Alluvium

Lake Deposits

Swamp Deposits

Stratified Drift (Outwash Deposits)

Ice-Contact Stratified Drift

1" = 1000'

B. SURFICIAL GEOLOGY:

Most of the site is covered by a relatively thin blanket of glacial material called till. Till, which was deposited directly from the glacial ice, contains a variable mixture of clay, silt, sand, gravel and boulders. The texture of till may be sandy and loose, silty and compact, stony, non-stony or otherwise. It also varies from place to place. Typically, the upper three (3) to five (5) feet of a till deposit will be sandy, stony and loose. However, at depths of five (5) feet or more and occasionally at shallower depths, the loose till may give way to a more compact, slightly finer grained till. Thickness of the till to bedrock is probably no greater than ten (10) feet throughout the site.

Another type of glacial sediment covering the site, mainly in the central and eastern parts, is stratified drift. Stratified drift consists of sand, gravel, silt and clay which were deposited by meltwater streams emanating from glacier ice. These sediments which were deposited over the till occur as relatively thin and elongated deposits that parallel the contours, particularly in the central parts. Two (2) types of stratified drift occur on the parcel; ice-contact stratified drift and outwash deposits. Ice-contact stratified drift consists of pale yellowish-brown, grayish-red or grayish orange-pink stratified sand and gravel. These deposits were laid down in close relation to the melting glacier and, therefore, are generally coarser grained. On the other hand, outwash deposits are typically finer-grained, and were deposited away from the glacier ice. Both deposits are well to poorly sorted.

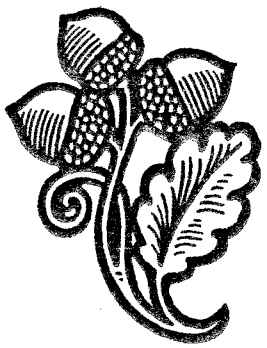
A final glacial deposit found in a relatively small area at the northern tip of the property are glacial lake deposits. These deposits consist of laminated moderate yellowish-brown clayey silt and sand. They were deposited in a glacier lake known as Glacial Lake Hitchcock which extended from Connecticut into Massachusetts.

Post-glacial sediments found on the parcel includes swamp sediments and alluvium. Both of these deposits cover the lowlying areas in the central parts of the site.

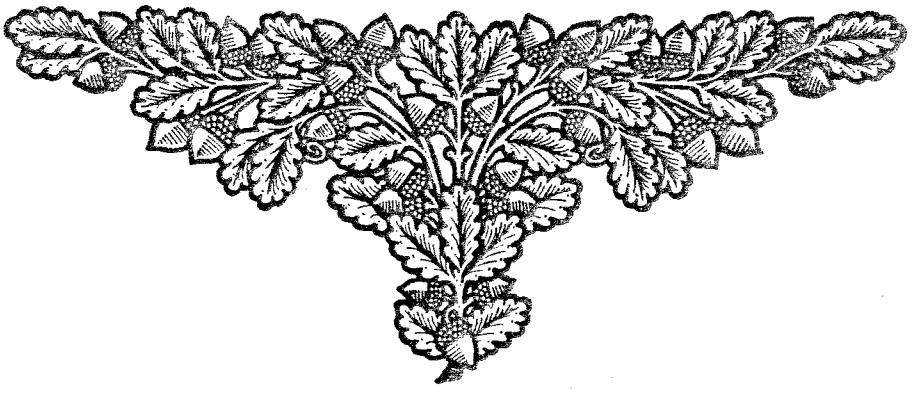
Swamp sediments consist of grayish-brown peat, muck, silt and clay. These deposits generally range in thickness between five (5) and ten (10) feet, but they may be as much as twenty-five (25) feet thick.

Alluvial deposits, which generally parallel the tributary to Austin Brook in the northern limits, consist of light grayish brown sand and gravel.

Soils comprising swamp sediments and alluvial deposits are regulated in the State under Public Act Number 155.



4. HYDROLOGY



The parcel of land can be divided roughly into five (5) separate watersheds. Surface water on a major portion of the site flows downslope to the wetland area that bisects the central parts of the parcel. An unnamed, northflowing stream flows through the wetland enroute to Austin Brook. Surface runoff in the northwest corner of the site flows downslope to the wetland area identified as 'enhanced natural retention' on the preliminary plan. The outlet stream for this wetland area flows northward and ultimately empties into Austin Brook. Austin Brook is a tributary to Stony Brook.

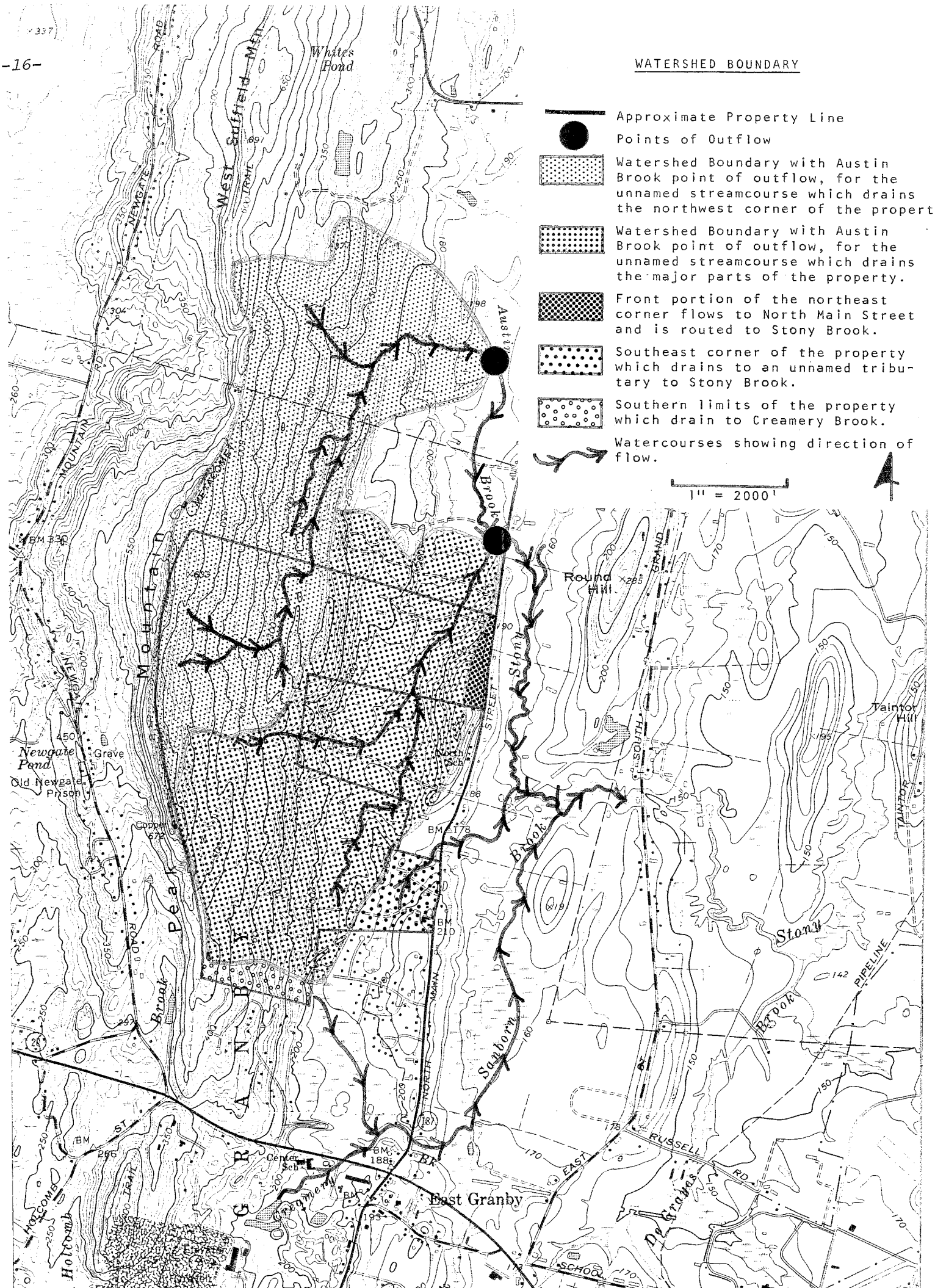
Surface runoff along the front portion of the property in the northeast corner flows downslope towards North Main Street. Road drainage intercepts this surface flow and routes it eastward to Stony Brook. Surface runoff along the front portions of the site in the southeast corner drains to an unnamed tributary to Stony Brook. Finally, runoff from the southern limits of the property flows downslope to a large wetland area and ultimately into Creamery Brook. (see Watershed Boundary Map.)

A. RUNOFF AND STORMWATER MANAGEMENT:

Development of the site under present plans would be expected to cause significant increases in the amount of runoff shed from the site. These increases would arise mainly from the creation of impervious surfaces such as roof tops, driveways, patios, or interior road systems over otherwise pervious soils. Detailed hydrologic calculations for the proposed subdivision have not been prepared to date. Based on the preliminary hydraulic study made available to Team members, it indicates runoff from the site would increase from 197 cubic feet per second (before development) to 465 cubic feet per second (after development). This is an increase of about 136% for a twenty-five (25) year storm event. This increase is quite substantial and will necessitate a careful stormwater management plan which includes pre-and post development runoff calculations.

The major concerns of increased runoff include flooding and the potential for streambank erosion. Although both are of concern with regard to the proposed project, it seems likely that the latter would be of most concern, especially in view of the very steep slopes present in the western parts. A concerned citizen, who resides near the proposed subdivision, indicated to the Team's Coordinator that water quality problems (siltation and turbidity) had arisen in shallow wells along North Main Street during timber harvesting on the hillside several years ago. Signs of erosion (gullying) along logging roads are visible throughout the hillside. The applicant's engineer will need to locate potential sites for sedimentation basins.

The purpose of these basins would be to minimize the chance for unwanted sediment from reaching drainageways or streamcourses on and off site. If sediment does accumulate in these basins, it will have to be removed periodically in order to assure that storage capacity of the pond is not seriously diminished. As a result, it should be determined who will be responsible for maintaining the basins


WATERSHED BOUNDARY
Approximate Property Line
Points of Outflow
Watershed Boundary with Austin Brook point of outflow, for the unnamed streamcourse which drains the northwest corner of the property.
Watershed Boundary with Austin Brook point of outflow, for the unnamed streamcourse which drains the major parts of the property.
Front portion of the northeast corner flows to North Main Street and is routed to Stony Brook.
Southeast corner of the property which drains to an unnamed tributary to Stony Brook.
Southern limits of the property which drain to Creamery Brook.
Watercourses showing direction of flow.
1" = 2000'
Whites Pond
West Suffield Mtn
Mountain
Peak
Round Hill
Taintor Hill
Newgate Pond
Old Newgate Prison
Grave
East Granby
Austin Brook
Stony Brook
Sanborn Brook
Creamery Brook
Holcomb Brook
DeGraves Brook
NEWGATE ROAD
NEWGATE TRAIL
HOLCOMB TRAIL
NORTH MAIN STREET
SOUTH MAIN STREET
TAINTOR HILL
RUSSELL RD.
EAST STREET
SCHOOL
PIPELINE
Center Sch.
North Sch.
Copper
BM 330
BM 178
BM 210
BM 266
BM 188
BM 193

and that access to the basins be provided. It seems likely that sediment retention ponds may also be designed to function as stormwater detention ponds. It appears that the ponds for the proposed golf course in the wetland area in the central parts could be utilized for detention basins. (see Section on Flood Prone Areas.) Finally, all storm drain outlets should include a designed energy dissipator to help protect areas below outlets from gullying.

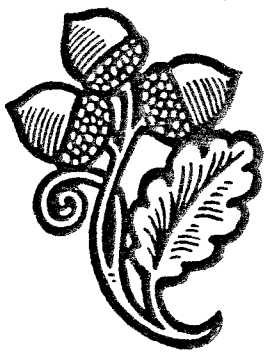
Design specifications for all stormwater control facilities and erosion control devices should be included on the subdivision plan for review by appropriate Town officials.

Depending on the final plan, inland wetland soils on the site may need to be crossed in order to construct the proposed interior road system, and depending on desired house locations, driveways may also need to cross inland wetland soils. Although undesirable, wetland road crossings are feasible provided they are properly engineered. The road should be constructed adequately above the surface elevation of the wetlands. This will allow for better drainage of the road and also decrease the frost heaving potential of the road. Soil borings in the wetland areas to be crossed are advised to determine whether or not there is any appreciable amounts of peat, muck or clay matter. All three (3) can lead to an unstable roadbase and result in a sinking or impossible roadbed. If present, these materials will need to be removed to a stable soil layer and backfilled with proper material. Road construction through wetlands should preferably be done during the dry time of the year, and should include provisions for effective erosion and sediment control. Finally, culvert (s) should be properly sized and located so as not to alter the water levels in the wetland or cause flooding problems.

B. FLOOD PRONE AREAS:

A Flood Insurance Rate Map for East Granby has been prepared by the Federal Emergency Management Agency/Federal Insurance Administration. This study includes maps which identify areas throughout the Town that are subject to flooding during the 100 and 500 year storms. A "100" year flood is a flood with one chance in 100 or one percent (1%) chance that it will happen in any year. A "500" year flood would have a one chance in 500 or 0.2% chance of occurring in any given year. It should be pointed out that this does not mean a flood of the magnitude mentioned will occur only once in a 100 or 500 year period. The probability of occurrence remains the same each year regardless of what happened the year before.

Based on the map, the wetlands in the northwest corner are located within the 500 year flood boundary. The large wetland stretching through the east/central parts of the site are located within the 100 year flood boundary. As a result, these areas have a natural capacity for stormwater retention. Since these areas have the ability to provide natural storage for stormwater, it would be ideal to leave them in their natural condition and locate any proposed detention basins on upland soils.



5. SOIL CONCERNS

A. SOIL RESOURCES AND LIMITATIONS:

"The Ridge" property consists of very complex soil landscapes ranging from very steep bedrock controlled landscapes on the western side of the parcel, to deep compact till landscapes on the eastern side. The center of the parcel is dominated by low compact till ridges, wetland landscapes of lacustrine and till soils, and narrow terraces of glacial outwash soils with a thick, silty aeolian cap.

Included in this report for general planning purposes is a copy of the map sheet from the **Hartford County Soil Survey, 1962**. This soil survey at a scale of 1" = 1,666.7' shows enough detail for general planning, but is not sufficient for a development of this intensity. An intense soil survey of both wetland and non-wetland soils should be done at a scale of 1" = 1,000' or larger. Wetland boundaries should be flagged, surveyed, and shown on a plan map. Below are listed additional comments on the soil resources of the parcel as they relate to the proposed "Ridge" development:

(1) An on-site investigation of portions of the western part of the parcel have lead the Team Soil Scientist to believe that there is a much smaller area of Narragansett soils than is shown on the soil survey map. There is probably a much larger area of soils moderately deep to shallow over bedrock than is indicated. Detailed soil mapping and deep test pits will be necessary to establish the feasibility of developing this portion of the property for the proposed density. This information is especially important if on-site septic systems are needed.

(2) Most of the soils on the parcel have the potential to be **highly erodible**, thus making erosion and sediment control a very important component of any plan and it's implementation.

(3) Most of the wetland soil landscapes receive much of their surface and subsurface water from one (1) uplands associated with this parcel. Modification in surface and subsurface drainage can have detrimental effects on the soil-water state of the wetlands.

(4) The golf course, recreational facilities, and some homes are planned on wetland soils. Substantial fill and surface and subsurface drainage would be needed to overcome the soil limitations.

(5) Many of the soils on the parcel have major soil limitations for on-site septic systems. These limitations include steep slopes, soils with slow perc rates, and shallow depths to bedrock. These limitations can be overcome, but should be taken into consideration when evaluating density and costs.

(6) There are many small areas of wetland soils, non-wetland soils, and watercourses that will be shown by an intense soil survey and should be taken into consideration when planning roadn and storm drainage, lot size, and layout.

(7) Any changes in the quantity, quality, or velocity of water in watercourses leaving "The Ridge" property may affect landowners downslope and downstream.

Additional information on the soils can be found on the enclosed chart. Map unit names can be found on the attached Map unit Legend from the Soil Survey of Hartford County, 1962.

B. EROSION AND SEDIMENT CONTROL:

Only preliminary information is provided for the 61,600 linear feet of proposed public roads and private drives, along with buildings, recreation areas, culvert crossings and storm drain outlets.

There will be an extensive storm drainage system resulting from the new roads and roof runoff. It will substantially increase downstream water flows. Many environmental problems will need to be addressed regarding the effects of soil and vegetative disturbances, road construction, sewer and stormwater pipelines, and building construction, and any potential damages to the watercourses.

Stony Brook eventually handles all of the runoff water from the proposed development area. Numerous watercourses presently carry runoff flows off the slopes and into Stony Brook. Stony Brook passes through the Town of Suffield and empties into the Connecticut River.

A phase system during construction is proposed. Temporary or permanent type detention ponds may be necessary. It will be important to plan for zero increase in runoff waters off the property to minimize and additional downstream flood problems.

A detailed erosion and sediment (E & S) Control plan should be completed for assurance that measures will be installed to design in a timely manner. It will be most practical to install E & S measures that will keep sediment "on-site" at each construction area. The further soil sediment moves away from the site, the more costly and difficult it will be to control. Damages will also increase.

The Connecticut Erosion and Sediment Control Handbook is a guide for choice of practices to use, along with technical information.

C. AGRICULTURAL LANDS:

Properties of several landowners are included in this parcel. Agricultural crops are presently being grown on the cropland. Crop fields of annual crops, hay and pasture consist of about 223 acres of twenty-seven percent (27%) of the 820 acre parcel. A total of about eighty-two (82) acres of the cropland is classified as ***Prime Farmland****, with about seventy-one (71) acres as* ***Additional Farmland of Statewide Importance****. This totals 153 acres of the 223 acres of cropland. The remaining 597 acres or seventy-three percent (73%) is woodland. A total of about twenty-six (26) acres of the woodland is* ***Prime Farmland****, with about seventy-six (76) acres having* ***Additional Farmland of Statewide Importance.***

APPROXIMATE ACREAGES:

	TOTAL	PRIME FARMLAND	ADDITIONAL FARMLAND OF STATEWIDE IMPORTANCE
Cropland	223	82	71
Woodland	597	26	76
Total	**820**	**108**	**147**

If agricultural land is saved, consider placing a wide buffer between the cropland and residential land. Evergreen trees are generally suitable for buffers. Some uses for agricultural lands within or adjacent to residential development can be:

--Leasing to local farmers to grow various crops.
--Community gardens used by the homeowners.
--Orchards, brambles, christmas trees (could be maintained by local Vo-Ag High School Students as a project).
--Hayland and pasture for livestock (beef, cows, horses or sheep).
--Timber production on a tract or tracts of woodland (secondary benefits would be recreation and wildlife uses).

The effect of the loss of this agricultural land on farms who rent it should be considered.

D. PONDS:

A total of thirteen (13) ponds are proposed, varying in size from .3 acres to 5.65 acres. They will be located on the wetland soils mostly within the golf course area and the recreation area of the ball fields. It is assumed that they will be pit type or excavated ponds, and will be for multi uses. Irrigation will be one use. There was no mention of pond depth.

Ponds numbered 7, 8, and 9 will be located on Wilbraham soils. Pond 13 will be on Menlo soils. These five (5) ponds will be located on soils having a hardpan at a two (2) foot depth. Unless the areas of surface and subsurface watershed supplying these ponds are maintained, they may not have a suitable year round water supply.

Pond 10 will be excavated on Elmwood soils. This soil type is moderately well drained and probably will not have an adequate amount of water for a pond.

Ponds 1, 2, 3, 4, 5, and 6 are located on Scarboro and Walpole soils. These ponds, if properly constructed, should have adequate water, although there can be large flucuations between spring and fall. One (1) problem during construction will be cutbanks caving. The pond sideslope may end up closer to 3:1 or flatter versus a more desired 2:1 or 2:5 sideslope. If eight (8) feet or more of water depth is obtained, a more gradual sideslope should not be a great problem.

Ponds 11 and 12 will be on a combination of Biddleford and Scantic soils. These should be adequate pond site soils. One major problem will be refilling after irrigation water is pumped out. These soils have slow permeability and refill of the ponds will be slow.

If the ponds are to be used for storm water detention, it may be desirable to keep some of them as dry detention ponds for temporary storm water storage only. A small dam or dike and control flow can be constructed at the outlet. But, pit type ponds will have limited freeboard for additional temporary storage at peak storm runoffs unless dams are additional temporary storage at peak storm runoffs unless dams are constructed for additional storage above the normal groundwater table.

It will be wise to dig test holes at each proposed pond site in the spring or early summer. The water table can then be observed through the droughty season. Cover the holes between observations for safety purposes. Another method would be to place a ten (10) foot pipe down in the proposed pond areas, and observe the water table in the pipe during the droughty season. If there is more than a two (2) foot fluctuation of water table the pond can be a problem pond.

Approval will be needed from the Town Inland-Wetland Commission for digging the ponds and placing of spoil within the wetland area. A plan should be worked up showing the spoil spreading areas and the final landscaping and seeding of the pond banks and adjacent areas.

The "Enhanced Natural Retention: area is located on a shallow peat and muck bog. A field evaluation of this site to obtain a list of existing plants and animals may be important to determine if endangered species exist in the area. The storm waters from major storms will temporarily cover the area until released downstream and will probably change the ecology of the bog.

The question should be addressed on "what effect will the development have on the water quality of the ponds?", such as:

--septic fields, if used--
--water outleted from subsurface drains--
--surface runoff from roads--
--runoff from fertilizers and other chemicals used on lawns, shrubs, and trees.

E. RECREATION:

The proposed golf course and a series of pit type multi-use ponds will generally be located on inland-wetland soils. Properly constructed ponds will enhance the area and provide additional wildlife uses. The golf course will provide a limited number of "use days" per year because of wet soil conditions with water at or near the surface during much of the time. To prevent this, an intensive drainage system, and large amounts of fill would be necessary. The effectiveness of the drainage system would depend on an adequate outlet for both subsurface and surface drainage. An intensive preliminary investigation of potential problems for a golf course and other recreational facilities located on predominantly wet areas should be completed prior to approval. Other probable land use alternatives of the wetlands should also be evaluated. One (1) or more of these alternatives may prove to be more favorable for the area.

F. IMPACT ON PRESENT LAND USES:

The new roads, homes with lawn areas located on the proposed lots, golf course and recreation areas would generally eliminate the present cropland and woodland uses. The Metacomet Trail would also receive an impact from the proposed plan.

Further evaluation of the impact on increased downstream storm water flows will need to be completed. The runoff of the parcel will generally flow into Stony Brook.

The Town Commission should determine the impact of the loss of wetlands versus their value if left undisturbed. Natural wetlands have numerous values and functions such as assuring the protection of aquifers in the area, for wildlife uses, watercourse protection and storm water control.

SOILS

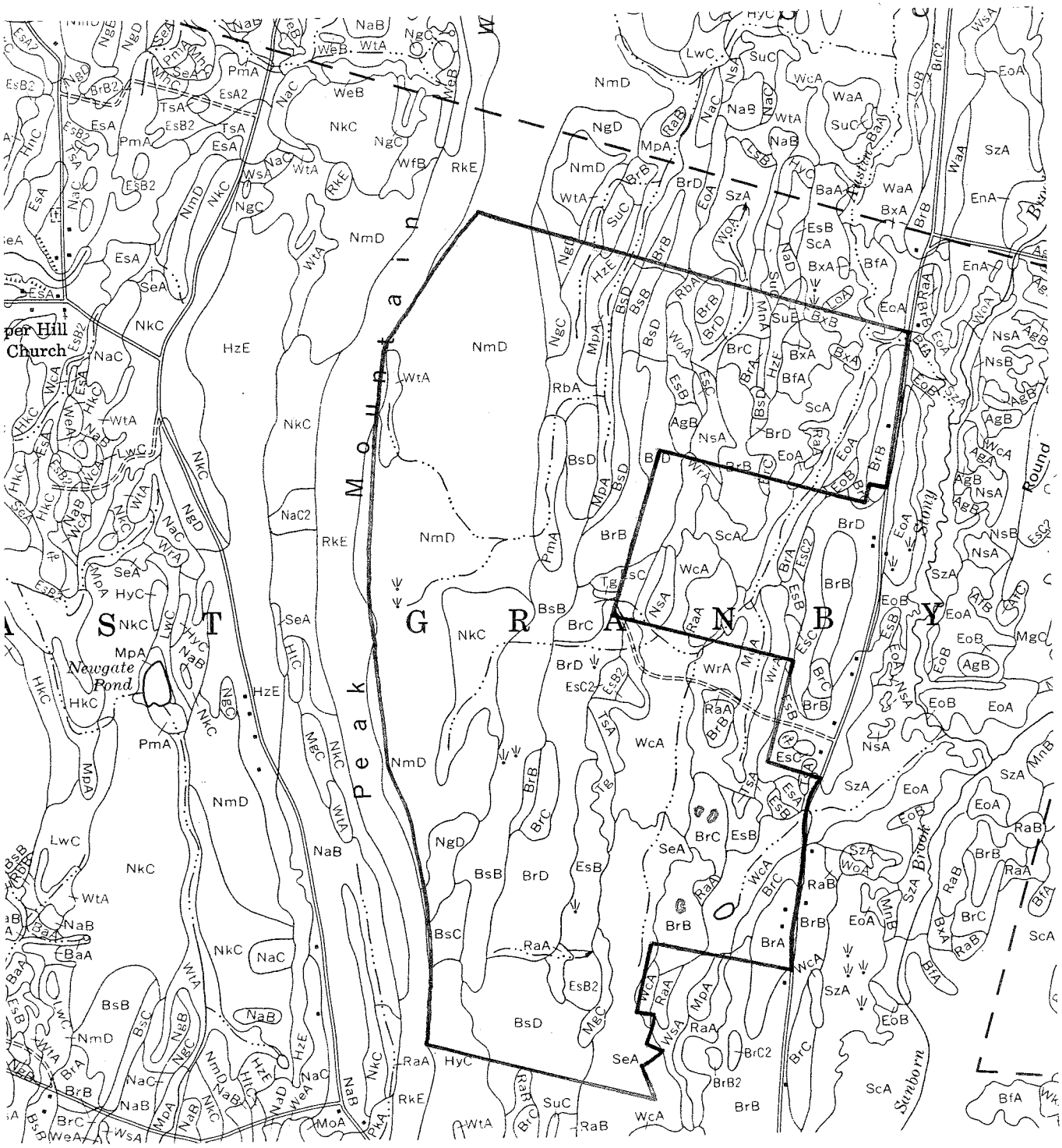
Perennial Stream

Intermittent Stream

Small Area of Extremely Stony or Bouldery Soils

Small Area of Poorly or Very Poorly Drained Soils

Scale 1:20,000



SOIL LEGEND

Each soil symbol consists of a combination of letters and numbers. The first capital letter is the initial of the soil series name. The second capital letter, if there is one, shows the class of slope and is given wherever slope forms part of the soil name. Some of the soils for which no slope letter is given are nearly level; some, such as Terrace escarpments, have a range of slope. A final number shows that the soil is named as eroded.

SYMBOL	NAME
AcA	Acton fine sandy loam, 0 to 3 percent slopes
AcB	Acton fine sandy loam, 3 to 8 percent slopes
AdB	Acton stony fine sandy loam, 3 to 8 percent slopes
AfA	Agawam fine sandy loam, 0 to 3 percent slopes
AfB	Agawam fine sandy loam, 3 to 8 percent slopes
AfC	Agawam fine sandy loam, 8 to 15 percent slopes
AgA	Agawam very fine sandy loam, 0 to 3 percent slopes
AgB	Agawam very fine sandy loam, 3 to 8 percent slopes
AgC	Agawam very fine sandy loam, 8 to 15 percent slopes
AkA	Agawam very fine sandy loam, overflow, 0 to 3 percent slopes
Am	Alluvial land
BaA	Belgrade silt loam, 0 to 3 percent slopes
BaB	Belgrade silt loam, 3 to 8 percent slopes
BbA	Belgrade silt loam, reddish variant, 0 to 3 percent slopes
BbB	Belgrade silt loam, reddish variant, 3 to 8 percent slopes
BcA	Berlin silt loam, 0 to 3 percent slopes
BcB	Berlin silt loam, 3 to 8 percent slopes
BcC	Berlin silt loam, 8 to 15 percent slopes
BdA	Bermudian sandy loam, 0 to 3 percent slopes
BeA	Bermudian silt loam, 0 to 3 percent slopes
BfA	Biddeford silt loam, 0 to 3 percent slopes
BgA	Biddeford silt loam, reddish variant, 0 to 3 percent slopes
BhA	Birchwood fine sandy loam, 0 to 3 percent slopes
BhB	Birchwood fine sandy loam, 3 to 8 percent slopes
BmA	Bowmansville silt loam, 0 to 3 percent slopes
BoA	Branford silt loam, 0 to 3 percent slopes
BoB	Branford silt loam, 3 to 8 percent slopes
BrA	Broadbrook silt loam, 0 to 3 percent slopes
BrB	Broadbrook silt loam, 3 to 8 percent slopes
BrB2	Broadbrook silt loam, 3 to 8 percent slopes, eroded
BrC	Broadbrook silt loam, 8 to 15 percent slopes
BrC2	Broadbrook silt loam, 8 to 15 percent slopes, eroded
BrD	Broadbrook silt loam, 15 to 25 percent slopes
BsA	Broadbrook stony silt loam, 0 to 3 percent slopes
BsB	Broadbrook stony silt loam, 3 to 8 percent slopes
BsC	Broadbrook stony silt loam, 8 to 15 percent slopes
BsD	Broadbrook stony silt loam, 15 to 25 percent slopes
BtB	Brookfield fine sandy loam, 3 to 8 percent slopes
BtC	Brookfield fine sandy loam, 8 to 15 percent slopes
BvB	Brookfield stony fine sandy loam, 3 to 8 percent slopes
BvC	Brookfield stony fine sandy loam, 8 to 15 percent slopes
BxA	Buxton silt loam, 0 to 3 percent slopes
BxB	Buxton silt loam, 3 to 8 percent slopes
BxC	Buxton silt loam, 8 to 15 percent slopes
CaA	Charlton fine sandy loam, 0 to 3 percent slopes
CaB	Charlton fine sandy loam, 3 to 8 percent slopes
CaC	Charlton fine sandy loam, 8 to 15 percent slopes
CaD	Charlton fine sandy loam, 15 to 25 percent slopes
ChB	Charlton stony fine sandy loam, 3 to 8 percent slopes
ChC	Charlton stony fine sandy loam, 8 to 15 percent slopes
ChD	Charlton stony fine sandy loam, 15 to 25 percent slopes
CrC	Charlton very stony fine sandy loam, 3 to 15 percent slopes
CrD	Charlton very stony fine sandy loam, 15 to 35 percent slopes
CsA	Cheshire fine sandy loam, 0 to 3 percent slopes
CsB	Cheshire fine sandy loam, 3 to 8 percent slopes
CsB2	Cheshire fine sandy loam, 3 to 8 percent slopes, eroded
CsC	Cheshire fine sandy loam, 8 to 15 percent slopes
CsC2	Cheshire fine sandy loam, 8 to 15 percent slopes, eroded
CsD2	Cheshire fine sandy loam, 15 to 25 percent slopes, eroded
CtB	Cheshire stony fine sandy loam, 3 to 8 percent slopes
CtC	Cheshire stony fine sandy loam, 8 to 15 percent slopes
CtD	Cheshire stony fine sandy loam, 15 to 25 percent slopes
CvC	Cheshire very stony fine sandy loam, 3 to 15 percent slopes
CvD	Cheshire very stony fine sandy loam, 15 to 35 percent slopes
EfA	Ellington fine sandy loam, 0 to 3 percent slopes
EmA	Elmwood loamy sand, 0 to 3 percent slopes
EnA	Elmwood sandy loam, 0 to 3 percent slopes
EnB	Elmwood sandy loam, 3 to 8 percent slopes
EoA	Elmwood very fine sandy loam, 0 to 3 percent slopes
EoB	Elmwood very fine sandy loam, 3 to 8 percent slopes
EsA	Enfield silt loam, 0 to 3 percent slopes
EsA2	Enfield silt loam, 0 to 3 percent slopes, eroded
EsB	Enfield silt loam, 3 to 8 percent slopes
EsB2	Enfield silt loam, 3 to 8 percent slopes, eroded
EsC	Enfield silt loam, 8 to 15 percent slopes
EsC2	Enfield silt loam, 8 to 15 percent slopes, eroded
EwA	Enfield silt loam, overflow, 0 to 3 percent slopes
GcA	Gloucester fine sandy loam, 0 to 3 percent slopes
GcB	Gloucester fine sandy loam, 3 to 8 percent slopes
GcC	Gloucester fine sandy loam, 8 to 15 percent slopes
GcD	Gloucester fine sandy loam, 15 to 25 percent slopes
GsB	Gloucester stony fine sandy loam, 3 to 8 percent slopes
GsC	Gloucester stony fine sandy loam, 8 to 15 percent slopes
GsD	Gloucester stony fine sandy loam, 15 to 25 percent slopes
GvC	Gloucester and Brookfield very stony fine sandy loams, 3 to 15 percent slopes
GvD	Gloucester and Brookfield very stony fine sandy loams, 15 to 35 percent slopes
HaA	Hadley silt loam, 0 to 3 percent slopes
HdA	Hartford fine sandy loam, 0 to 3 percent slopes
HdB	Hartford fine sandy loam, 3 to 8 percent slopes
HfA	Hartford sandy loam, 0 to 3 percent slopes
HfB	Hartford sandy loam, 3 to 8 percent slopes
HfC	Hartford sandy loam, 8 to 15 percent slopes
HkA	Hinckley gravelly sandy loam, 0 to 3 percent slopes
HkC	Hinckley gravelly sandy loam, 3 to 15 percent slopes
HnC	Hinckley loamy sand, 3 to 15 percent slopes
HoC	Hollis rocky loam, 3 to 15 percent slopes
HoD	Hollis rocky loam, 15 to 35 percent slopes
HsC	Hollis very rocky loam, 3 to 15 percent slopes
HsE	Hollis very rocky loam, 15 to 35 percent slopes
HtC	Holyoke rocky silt loam, 3 to 15 percent slopes
HtD	Holyoke rocky silt loam, 15 to 35 percent slopes
HyC	Holyoke very rocky silt loam, 3 to 15 percent slopes
HzE	Holyoke very rocky loam, 15 to 35 percent slopes
LcA	Leicester loam, 0 to 3 percent slopes
LeA	Leicester stony loam, 0 to 3 percent slopes
LdA	Leicester, Whitman, and Ridgebury very stony soils, 0 to 5 percent slopes
LmA	Limerick silt loam, 0 to 3 percent slopes
LoA	Ludlow loam, 0 to 3 percent slopes
LoB	Ludlow loam, 3 to 8 percent slopes
LsB	Ludlow stony loam, 3 to 8 percent slopes
LwC	Ludlow and Watchaug very stony soils, 3 to 15 percent slopes
Ma	Made land
McA	Manchester gravelly loam, 0 to 3 percent slopes
McC	Manchester gravelly loam, 3 to 15 percent slopes
MgA	Manchester gravelly sandy loam, 0 to 3 percent slopes
MgC	Manchester gravelly sandy loam, 3 to 15 percent slopes
MhC	Manchester loamy sand, 3 to 15 percent slopes
MmA	Melrose sandy loam, 0 to 3 percent slopes
MmB	Melrose sandy loam, 3 to 8 percent slopes
MnA	Melrose very fine sandy loam, 0 to 3 percent slopes
MnB	Melrose very fine sandy loam, 3 to 8 percent slopes
MoA	Menlo silt loam, 0 to 3 percent slopes
MpA	Menlo stony silt loam, 0 to 3 percent slopes
MrA	Merrimac fine sandy loam, 0 to 3 percent slopes
MrB	Merrimac fine sandy loam, 3 to 8 percent slopes

Soil map constructed 1960 by Cartographic Division, Soil Conservation Service, USDA, from 1951 aerial photographs. Controlled mosaic based on Connecticut plane coordinate system, state zone, Lambert conformal conic projection, 1927 North American datum.

SYMBOL	NAME
MrC	Merrimac fine sandy loam, 8 to 15 percent slopes
MsA	Merrimac fine sandy loam, overflow, 0 to 3 percent slopes
MyA	Merrimac sandy loam, 0 to 3 percent slopes
MyB	Merrimac sandy loam, 3 to 8 percent slopes
MyC	Merrimac sandy loam, 8 to 15 percent slopes
NaA	Narragansett silt loam, 0 to 3 percent slopes
NaB	Narragansett silt loam, 3 to 8 percent slopes
NaB2	Narragansett silt loam, 3 to 8 percent slopes, eroded
NaC	Narragansett silt loam, 8 to 15 percent slopes
NaC2	Narragansett silt loam, 8 to 15 percent slopes, eroded
NaD	Narragansett silt loam, 15 to 25 percent slopes
NgB	Narragansett stony silt loam, 3 to 8 percent slopes
NgC	Narragansett stony silt loam, 8 to 15 percent slopes
NgD	Narragansett stony silt loam, 15 to 25 percent slopes
NkC	Narragansett and Broadbrook very stony silt loams, 3 to 15 percent slopes
NmD	Narragansett and Broadbrook very stony soils, 15 to 35 percent slopes
NnA	Ninigret fine sandy loam, 0 to 3 percent slopes
NnB	Ninigret fine sandy loam, 3 to 8 percent slopes
NsA	Ninigret very fine sandy loam, 0 to 3 percent slopes
NsB	Ninigret very fine sandy loam, 3 to 8 percent slopes
OnA	Ondawa sandy loam, 0 to 3 percent slopes
PaB	Paxton fine sandy loam, reddish substratum, 3 to 8 percent slopes
PaC	Paxton fine sandy loam, reddish substratum, 8 to 15 percent slopes
PaD	Paxton fine sandy loam, reddish substratum, 15 to 25 percent slopes
PbB	Paxton loam, 3 to 8 percent slopes
PbC	Paxton loam, 8 to 15 percent slopes
PbD2	Paxton loam, 15 to 25 percent slopes, eroded
PcB	Paxton stony fine sandy loam, reddish substratum, 3 to 8 percent slopes
PcC	Paxton stony fine sandy loam, reddish substratum, 8 to 15 percent slopes
PcD	Paxton stony fine sandy loam, reddish substratum, 15 to 25 percent slopes
PdB	Paxton stony loam, 3 to 8 percent slopes
PdC	Paxton stony loam, 8 to 15 percent slopes
PdD	Paxton stony loam, 15 to 25 percent slopes
PeC	Paxton very stony loam, 3 to 15 percent slopes
PeD	Paxton very stony loam, 15 to 35 percent slopes
PkA	Peats and Mucks
PmA	Peats and Mucks, shallow
PnA	Penwood loamy sand, 0 to 3 percent slopes
PnB	Penwood loamy sand, 3 to 8 percent slopes
PnC	Penwood loamy sand, 8 to 15 percent slopes
PoA	Podunk sandy loam, 0 to 3 percent slopes
PpB	Poquonock loamy sand, 3 to 8 percent slopes
PpC	Poquonock loamy sand, 8 to 15 percent slopes
PuA	Poquonock sandy loam, 0 to 3 percent slopes
PuB	Poquonock sandy loam, 3 to 8 percent slopes
PuC	Poquonock sandy loam, 8 to 15 percent slopes
RaA	Rainbow silt loam, 0 to 3 percent slopes
RaB	Rainbow silt loam, 3 to 8 percent slopes
RbA	Rainbow stony silt loam, 0 to 3 percent slopes
RbB	Rainbow stony silt loam, 3 to 8 percent slopes
RdA	Ridgebury loam, 0 to 3 percent slopes
Re	Riverwash
RhC	Rocky land, Hollis materials, 3 to 15 percent slopes
RhE	Rocky land, Hollis materials, 15 to 35 percent slopes
RkC	Rocky land, Holyoke materials, 3 to 15 percent slopes
RkE	Rocky land, Holyoke materials, 15 to 35 percent slopes
RoA	Rowland silt loam, 0 to 3 percent slopes
RuA	Rumney sandy loam, 0 to 3 percent slopes
SaA	Saco sandy loam, 0 to 3 percent slopes
SbA	Saco silt loam, 0 to 3 percent slopes
ScA	Scantic silt loam, 0 to 3 percent slopes
SdA	Scantic silt loam, reddish variant, 0 to 3 percent slopes
SeA	Scarboro loam, 0 to 3 percent slopes
SsA	Sudbury fine sandy loam, 0 to 3 percent slopes
StA	Suncook loamy sand, 0 to 3 percent slopes
SuC	Sunderland rocky fine sandy loam, 3 to 15 percent slopes
SuE	Sunderland rocky fine sandy loam, 15 to 35 percent slopes
SvA	Sutton loam, 0 to 3 percent slopes
SvB	Sutton loam, 3 to 8 percent slopes
SwA	Sutton stony loam, 0 to 3 percent slopes
SwB	Sutton stony loam, 3 to 8 percent slopes
SxC	Sutton and Acton very stony loams, 3 to 15 percent slopes
SyA	Swanton sandy loam, 0 to 3 percent slopes
SzA	Swanton very fine sandy loam, 0 to 3 percent slopes
Tc	Terrace escarpments, clay
Te	Terrace escarpments, sand and clay
Tg	Terrace escarpments, sand and gravel
TsA	Tisbury silt loam, 0 to 3 percent slopes
TsB	Tisbury silt loam, 3 to 8 percent slopes
WaA	Wallington silt loam, 0 to 3 percent slopes
WbA	Wallington silt loam, reddish variant, 0 to 3 percent slopes
WcA	Walpole loam, 0 to 3 percent slopes
WdA	Walpole sandy loam, 0 to 3 percent slopes
WeA	Wapping silt loam, 0 to 3 percent slopes
WeB	Wapping silt loam, 3 to 8 percent slopes
WfA	Wapping stony silt loam, 0 to 3 percent slopes
WfB	Wapping stony silt loam, 3 to 8 percent slopes
WgA	Watchaug loam, 0 to 3 percent slopes
WgB	Watchaug loam, 3 to 8 percent slopes
WhA	Watchaug stony loam, 0 to 3 percent slopes
WhB	Watchaug stony loam, 3 to 8 percent slopes
WkA	Wethersfield loam, 0 to 3 percent slopes
WkB	Wethersfield loam, 3 to 8 percent slopes
WkB2	Wethersfield loam, 3 to 8 percent slopes, eroded
WkC	Wethersfield loam, 8 to 15 percent slopes
WkC2	Wethersfield loam, 8 to 15 percent slopes, eroded
WkD	Wethersfield loam, 15 to 25 percent slopes
WkD3	Wethersfield loam, 15 to 25 percent slopes, severely eroded
WmB	Wethersfield stony loam, 3 to 8 percent slopes
WmC	Wethersfield stony loam, 8 to 15 percent slopes
WmD	Wethersfield stony loam, 15 to 25 percent slopes
WnC	Wethersfield very stony loam, 3 to 15 percent slopes
WnD	Wethersfield very stony loam, 15 to 35 percent slopes
WoA	Whately loam, 0 to 3 percent slopes
WpA	Whitman stony loam, 0 to 3 percent slopes
WrA	Wilbraham silt loam, 0 to 3 percent slopes
WsA	Wilbraham stony silt loam, 0 to 3 percent slopes
WtA	Wilbraham and Menlo very stony silt loams, 0 to 3 percent slopes
WuA	Windsor loamy coarse sand, 0 to 3 percent slopes
WuB	Windsor loamy coarse sand, 3 to 8 percent slopes
WuC	Windsor loamy coarse sand, 8 to 15 percent slopes
WvA	Windsor loamy fine sand, 0 to 3 percent slopes
WvB	Windsor loamy fine sand, 3 to 8 percent slopes
WvC	Windsor loamy fine sand, 8 to 15 percent slopes
WwA	Winooski silt loam, 0 to 3 percent slopes
WxA	Woodbridge loam, 0 to 3 percent slopes
WxB	Woodbridge loam, 3 to 8 percent slopes
WyA	Woodbridge loam, reddish substratum, 0 to 3 percent slopes
WyB	Woodbridge loam, reddish substratum, 3 to 8 percent slopes
WzA	Woodbridge stony loam, 0 to 3 percent slopes
WzB	Woodbridge stony loam, 3 to 8 percent slopes
WzaB	Woodbridge stony loam, reddish substratum, 3 to 8 percent slopes
WzbC	Woodbridge very stony soils, 3 to 15 percent slopes

MAJOR LIMITATIONS FOR THE DEVELOPMENT OF :

Map Unit Symbol	General Soil Properties	Drainage Class & Depth to Seasonal High Water Table	Homes with Basements	Septic Tank Absorption Fields	Roads & Streets	Shallow Excavations	Golf Courses	Other Recreation Areas
GLACIAL TILL SOILS								
BrA 1	Glacial till soils formin compact silty material	well drained 1.5 - 2.5 ft.	-	percs slowly slope	-	-	-	-
BrB, BrB2 1	Same as above	same as above	-	same as above	-	-		slope
BrC, BrC2 1	Same as above	same as above	-	same as above	-	-		slope
BrD 1	Same as above	same as above	slope	same as above	slope	slope	slope	slope
BsB 1	Same as above, but with a very stony surface	same as above	-	same as above	-	-	large stones	large stones slope
BsC 1	Same as above	same as above	-	same as above	-	-	large stones	large stones, slope
BsD 1	Same as above	same as above	slope	same as above	slope	slope	slope, large stones	large stones, slope
HyC	Complex of shallow (∠20") silty till soils & exposed bedrock	somewhat excessive-drained >6 ft.	depth to bedrock	depth to bedrock	depth to bedrock	depth to bedrock	depth to bedrock	depth to bedrock, slope
HzE	Same as above	same as above	depth to bedrock, slope	depth to bedrock, slope	depth to bedrock, slope	depth to bedrock, slope	depth to bedrock, slope	depth to bedrock, slope
MpA	Glacial till soils formed in compact silty materials with an extremely stony surface	very poorly drained +1 - .5 ft.	wetness	wetness percs slowly	wetness, subject to frost action	wetness	wetness	wetness
NgC 2	Glacial till soils formed in very stony, silty materials over sandy materials	well drained >6ft.	-	substratum may be a poor filter	-	cut banks cave in	large stones	slope, large stones

Map Unit Symbol	General Soil Properties	MAJOR LIMITATIONS FOR THE DEVELOPMENT OF : Drainage Class & Depth to Seasonal High Water Table	Homes with Basements	Septic Tank Absorption Fields	Roads & Streets	Shallow Excavations	Golf Courses	Other Recreation Areas
GLACIAL TILL SOILS								
NgD 2	Glacial till soils formed in very stony, silty materials over sandy materials	well drained > 4ft.	-	slope, substratum may be a poor filter	slope	slope	slope, large stones	slope, large stones
NkC 2	Same as above	same as above	-	substratum may be a poor filter	-	cut banks cave in	large stones	slope
NmD 2	Same as above	same as above	slope	slope, substratum may be a poor filter	slope	slope, cut banks cave in	large stones	large stones
RaA	Glacial till soils formed in compact silty materials	moderately well drained 1.5 - 2.5 ft.	wetness	wetness, percs slowly	subject to frost action	wetness	-	-
RaB	Same as above	same as above	wetness	same as above	same as above	wetness	-	slope
RbA	Same as above, but with a very stony surface	same as above	wetness	same as above	same as above	wetness	large stones	large stones
RkE	Complex of exposed bedrock and shallow (<20") silty till soils over bedrock	somewhat excessively drained >6 ft.	depth to bedrock, slope	depth to bedrock, slope	depth to bedrock, slope	depth to bedrock, slope	depth to bedrock, slope	depth to bedrock slope
SuE	Complex of deep (>40") to shallow, silty glacial till soils	same as above	same as above	same as above	same as above	same as above	same as above	same as above above
WrA	Glacial till soils formed in compact silty materials	poorly drained	wetness	wetness percs slowly	wetness subject to frost action	wetness	wetness	wetness

MAJOR LIMITATIONS FOR THE DEVELOPMENT OF :

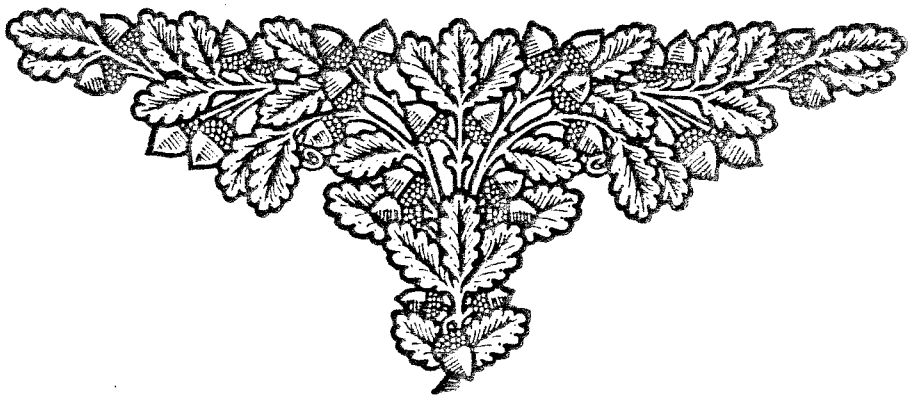
Map Unit Symbol	General Soil Properties	Drainage Class & Depth to Seasonal High Water Table	Homes with Basements	Septic Tank Absorption Fields	Roads & Streets	Shallow Excavations	Golf Courses	Other Recreation Areas
GLACIAL OUTWASH SOILS								
AgB	Glacial outwash soils formed in loamy materials over sand and gravel	well drained >4 ft.	-	substratum may be a poor filter	-	cut banks cave in	-	slope
EsB,EsB2	Glacial outwash soils formed in deep silty materials over sand and gravel	same as above	-	same as above	-	same as above	-	-
EsC,EsC2	Same as above	same as above	slope	same as above	-	same as above	-	slope
MgC	Glacial outwash soils formed in sandy materials over sand and gravel	somewhat excessively drained >4 ft.	slope	same as above	-	same as above	-	slope
NsA	Glacial outwash soils formed on loamy materials over sand and gravel	moderately well drained 2.5 - 4 ft.	seasonal wetness	wetness, substratum may be a poor filter	subject to frost action	wetness, cut banks cave in	seasonal wetness	seasonal wetness
SeA	Same as above	very poorly drained +1 - 1. ft.	wetness	same as above	wetness	same as above	wetness	wetness
Tg	Glacial outwash soils formed in slity to sandy materials over sand and gravel	well drained to somewhat excessively drained >6 ft.	slope	slope	slope	slope cut banks cave in	slope	slope
TsA	Glacial outwash soils formed in deep silty material over sand and gravel	moderately well drained 2.5 - 4 ft.	wetness	wetness, substratum may be a poor filter	subject to frost action	wetness, cut banks cave in	seasonal wetness	seasonal wetness
WcA	Glacial outwash soils formed in silty materials over sand and gravel	poorly drained	wetness	same as above	same as above	wetness, cut banks cave in	wetness	wetness

MAJOR LIMITATIONS FOR THE DEVELOPMENT OF :

Map Unit Symbol	General Soil Properties	Drainage Class & Depth to Seasonal High Water Table	Homes with Basements	Septic Tank Absorption Fields	Roads & Streets	Shallow Excavations	Golf Courses	Other Recreation Areas
LACUSTRINE SOILS								
BxA	Lacustrine soils formed in silty over silty and clayey materials	poorly drained 0 - 1. ft.	wetness	wetness, substratum may be a poor filter	wetness, subject to frost action	wetness, cut banks cave in	wetness	wetness
BxB	Same as above	moderately well drained 1 - 2.5 ft.	wetness	wetness percs slowly	subject to frost action	wetness	seasonal	wetness, percs slowly
BfA	Same as above	very poorly drained +1 - .5 ft.	wetness	same as above	same as above	wetness	wetness	wetness, percs slowly
EoA	Lacustrine soils formed in loamy over silty and clayey materials	moderately well drained 1.5 - 3 ft.	wetness	wetness, percs slowly	same as above	wetness	seasonal wetness	seasonal wetness percs slowly
EoB	Same as above	same as above	wetness	same as above	same as	wetness	seasonal wetness	seasonal wetness percs slowly
ScA	Lacustrine soils formed in silty over silty and clayey materials	poorly drained 0 - 1.5 ft.	wetness	same as above	wetness, subject to frost action	wetness	wetness	wetness,percs slowly
SzA	Lacustrine soils formed in loamy over silty and clayey materials	same as above	wetness	same as above	same as above	wetness	wetness, percs slowly	wetness, percs slowly
WoA	Lacustrine soils formed in silty over silty and clayey materials	very poorly drained +1 - .5 ft.	wetness	same as above	same as above	wetness	wetness, percs slowly	wetness,percs slowly
OTHER SOILS								
PMA	Organic soils formed in deep decomposed organic matter	very poorly drained +1 - 1.0 ft.	wetness	wetness	wetness, subsides	wetness	wetness	wetness

NOTES:
1 -- Seasonal water table for brief period is not considered a major use restriction.
2 -- These units may contain large areas of soils shallow or moderately deep to bedrock. Also included are large areas of soils with a firm, dense substratum.

6. GEOLOGIC DEVELOPMENT CONCERNS



Although preliminary plans distributed to Team members indicate that the proposed subdivision would be served by public sewers, Town officials led Team members to believe on the review day that a public sewer line may not be extended to serve the parcel. If the sewer line is not extended to the site, homes in the subdivision would need to rely on individual on-site septic systems or community septic systems. It was also noted on the preliminary plan and by the developer's representative on the review day, that the subdivision would be served by a community on-site well or wells.

The major limiting geologic factors found on the site which may pose potential problems with regard to developing the site as a high-density subdivision include: 1) the shallow depth to bedrock conditions throughout most of the property; 2) the presence of moderate to very steep slopes mainly in the western and central parts; 3) the presence of lake deposits in the northern limits which may or may not contain a high percentage of clay particles; 4) the presence of swamp sediments in the central parts; and 5) the presence of the steep scarp just west of the property, which lends itself to being a potential hazard for residents of the development, especially adventuresome children (e.g., injuries resulting from falls off the high cliffs). While these geologic characteristics do represent limitations for development of the site, the availability of a public sewer line and a potential community or public water supply tends to make developing the land less problematic. With very careful planning and good engineering practices, it seems likely that the geologic limitations mentioned above may be overcome, but only at great expense.

Because bedrock is exposed at or near ground surface throughout much of the parcel, it certainly appears that blasting will be necessary whether for the construction of roads, building foundations or for the creation of trenches for public water and sewer lines.

If proper precautions are not taken, there is a chance that blasting could lead to 1) increased turbidity levels in surface water and groundwater, at least in the immediate vicinity; 2) increase the number of fractures or openings in the solid bedrock at least in the immediate vicinity, which may or may not impact nearby wells which rely on the underlying bedrock as a water source (it should be pointed out that water stored in fractures and openings in the underlying bedrock is the source of groundwater to wells which tap the bedrock); and 3) possibly cause damage to nearby structures and foundations. In regard to the last comment, a pre-blasting survey of surrounding properties should probably be considered to reduce unwarranted damage claims. It seems likely that most blasting will be far removed from existing structures. Any blasting activity which takes place on the site should be under the strict supervision of persons experienced with state of-the-art blasting techniques. This will hopefully reduce the chance of unnecessary seismic shock or possible damage claims.

On the other hand, if public sewers are not extended to the site, on-site septic systems or a community septic system (s) would need to be developed. The occurrence of near-surface bedrock throughout the site will be a major hindrance to development. Engineered septic systems, which would probably

require extensive filling and/or cutting, would be required on virtually every lot. Although soil testing has been conducted throughout the site, the results were not made available to Team members. Nevertheless, it seems likely that if homes in the proposed subdivision need to rely on individual on-site septic systems or community systems, there would need to be a significant reduction in the number of homes presently proposed.

Although it may be technically possible to create a large, conventional subdivision in the site, it seems likely that such a development would be inordinately expensive, at least if all the proper engineering and planning techniques were used to surmount the geologic limitations of the site.

With the shallow to bedrock soils predominating and moderate to very steep slopes, the parcel would be unfavorable for a high intensity development which needs to rely on on-site septic systems. Nevertheless, there are some areas of relatively flat to gentle slopes and deep soils (information obtained from verbal communication with applicant's representative) where homes and septic systems might be readily accommodated. However, it seems likely that only low to perhaps moderate density might be feasible. If a community septic system (s) were placed in the pocket of "good" soil, the homes themselves could be placed in the rockier, steeper adjacent areas, since shallow depths to bedrock would be less of a problem for residential structures than it would be for sanitary facilities. This would probably allow for a greater number of residences on the site. In a conventional subdivision, (homes served by on-site septic systems), the deep soil areas could be entirely taken up by a few single-family lots. If a number of houses were connected to a community septic system, the volume of sewage being discharged would or could be substantial, thus necessitating the need for sizeable disposal (leaching) areas. As a result, considerable on-site testing in the more favorable areas of the parcel would need to be conducted by the applicant's engineer. Extensive soil testing would also be required if individual on-site sewage disposal systems are required. The soil testing should be coordinated with the Farmington Valley Health District.

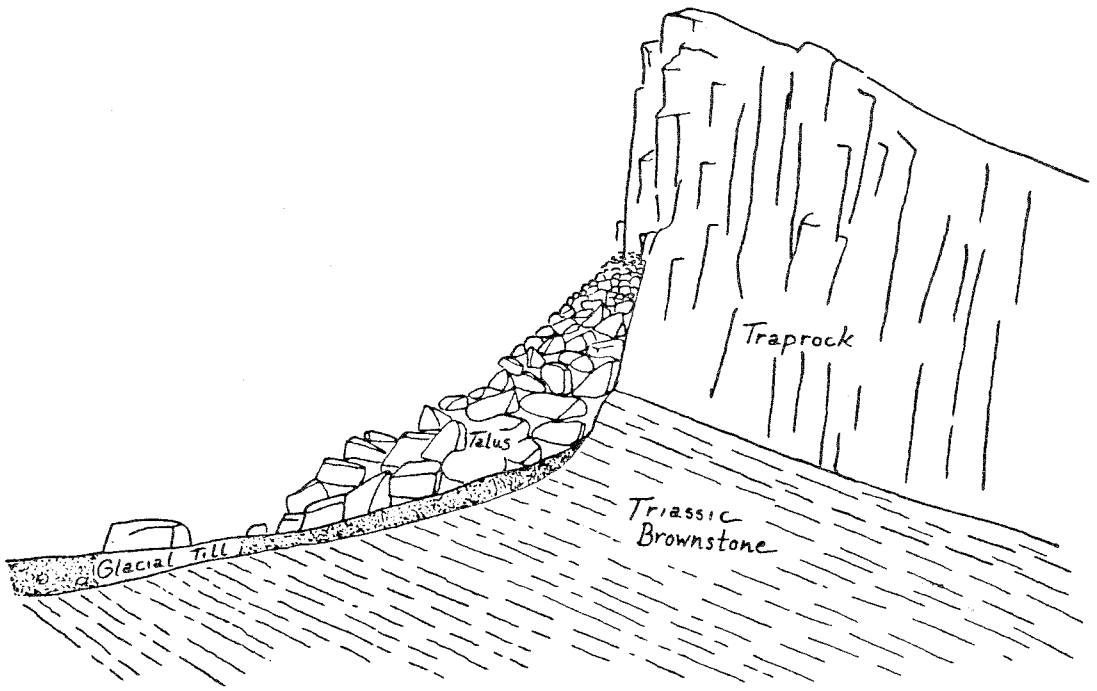
It should be pointed out that design plans for a community sewage system would require the review and approval of the Department of Environmental Protection. Requirements and the responsibility for the operation and maintenance of such a system would also be incorporated with the plans or permit to discharge. It is understood the local water pollution control agency would be part of any possible acceptance or approval process.

In moderate to very steeply sloping areas, conditions may become hazardous for heavy equipment and will probably require considerable regrading. Also, because the potential for serious erosion problems are high in these areas, particularly if blasting is required, it is recommended that a comprehensive erosion and sediment control plan be formulated and followed closely with implementation of the project.

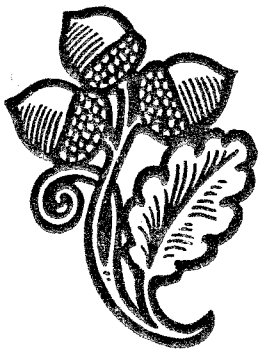
In regard to the steep scarps west of the site, it is recommended that the applicant address this potential hazard thoroughly, so that it does not become an "attractive" nuisance to residents, particularly children living in the proposed development. Consideration might be given in advance to controlling access to this portion of the site, i.e., establishment of a homeowners association.

Protective fencing along the top may be of consideration in this regard.

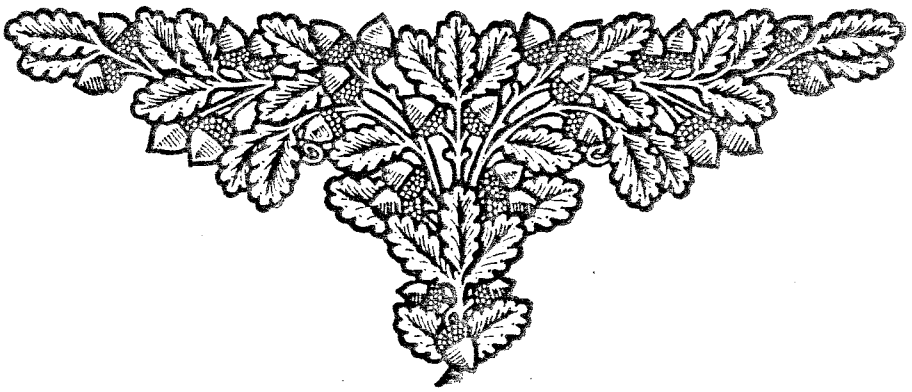
If any development, i.e., house foundations, roads, recreation facilities, etc., takes place in or near the lake deposits in the northern parts, it is recommended that soil borings be drilled first and the soil analyzed. The possibility for clay particles in these soils could present severe problems in terms of stability for structured roads, etc.



Geological structure of a typical traprock ridge



7. WATER SUPPLY



Since no public water supply facilities would be available to the site, any residential development would have to be served by on-site well or wells. The only practical source of groundwater would be the bedrock aquifer. Depending upon certain hydrogeologic factors, stratified drift deposits may have high potential for serving as a public groundwater supply source. The highest yields are generally obtained from thick coarse-grained deposits which are saturated and located near large streams. It does not appear that the stratified drift within the site fits the hydrogeologic condition mentioned above. In order to be sure however, exploratory wells would need to be drilled to determine the potential of the stratified drift on the site as a public water supply source. Surveys of bedrock wells in the State generally shows that eighty percent (80%) to ninety percent (90%) of the surveyed wells can yield at least three (3) gallons per minute, an amount considered sufficient to meet the needs of a single household. A very few bedrock wells can supply more than fifty (50) gallons per minute and few yield less than one (1) gallon per minute.

Based on preliminary plans, the proposed community well (s) is located in the western part of the site. This area is underlain by Holyoke Basalt. According to Water Resources Bulletin Number 24, Upper Connecticut River Basin, the yield of twenty-one (21) wells tapping basalts ranges from three (3) to one hundred twenty-five (125) gallons per minute and an average of nineteen (19) gallons per minute. In some cases, wells have penetrated the basalts and tapped the underlying sedimentary rocks, which have tended to be more productive. It should be noted a six inch (6") bedrock well, which taps the underlying basalt (Hampden) and is located along North Main Street (E. Root Property) near the property, is reportedly yielding six (6) gallons per minute.

In regard to a central or community water system, careful siting with provisions for maintenance of adequate separating distances from sewer lines, sewage disposal systems or other source of pollution is needed. Also adequate well (s) yield to supply water for the intended number of dwellings would be necessary. Community water systems are to be reviewed and approved by the Water Supplies Section of the State Department of Health Services and Department of Public Utilities Control. A certificate of convenience and necessity must be issued jointly by the Department of Health Services and Department of Public Utility Control prior to constructing any new water system being planned to serve the development. If an existing water supply system is planning to expand in order to serve additional customers, a certificate must also be obtained. It is recommended that the developer or the Newgate Ridge Water Company contact the Department of Public Utility Control for an application for the subject certificate if a community water supply system is to serve this development.

The Team's geologist was able to calculate, based on some assumptions, what the potential yield of well or wells would be needed to be in order to serve the proposed 518 house subdivision. If it may be assumed that each unit contained four (4) bedrooms and four (4) residents, a total of 2,072 residents would have to be served by the arrangement.

If each resident needed seventy-five (75) gallons of water per day* to meet his/her needs, a total of 155,400 gallons per day would be needed. A bedrock well or wells yielding a total of 144 gallons per minute would be required to adequately serve the subdivision. Of course, the peak demand on any given day may be greater than 144 gallons per minute, therefore, a storage system of some kind would have to be provided. This can be accomplished by the installation of a single water storage tank or an individual tank in each building. Storage tanks are sized based on the "peak hour demand". The "peak hour demand" occurs during the hour in which the largest volume of water is consumed and shall be considered one third (1/3) of the average daily consumption.

For example, under total development where the average daily consumption is estimated to be 155,400 gallons, approximately one third (1/3) or about 52,000 gallons of useable storage would be required for the total project.

As a point of interest, the above mentioned design criteria does not include requirements for fire protection and irrigation for the proposed golf course/recreation areas. It is the responsibility of the design engineer and the water supply owner to insure that the applicable federal, state and local fire protection requirements are satisfied.

In addition, water supply systems serving over 1,000 people will require a minimum of two (2) distinct well sources. Each well must be capable of meeting the average daily consumption demands plus useable storage.

If more than one (1) well is needed to fulfill the needs of the residents of the subdivision complex, the wells should each be conservatively separated if possible. This will, hopefully, help to prevent the chance of mutual interference of one (1) well with another during pumping periods.

The natural quality of the groundwater should be good. There is potential, however, for elevated concentrations of iron, manganese and hardness in water from some wells, particularly where the bedrock tapped by the well is basalt. A major water quality concern is the serious risk of groundwater contamination by septic systems (if a conventional subdivision is constructed) due to the shallow to bedrock soils.

Since a cluster subdivision could use a community septic system or a few such systems, and since these systems must undergo DEP's stringent evaluation procedures before being approved, the risks from a cluster development are probably less than those that would accompany a large-scale conventional subdivision. In the standard arrangement, individual systems would be spread throughout the subdivision. Failures would be less easy to control in such an arrangement, and the distribution of potential contaminants would be more extensive. Of course, individual septic failures would be less serious than a failure of a community system since the former would involve much smaller

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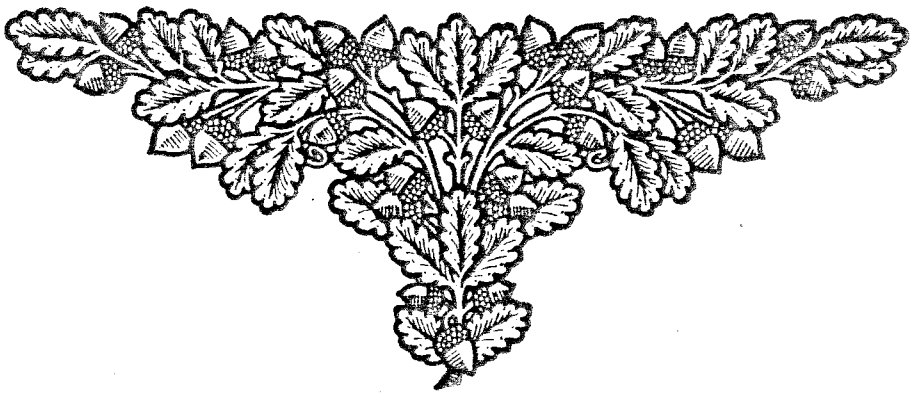
*"Community Water Supply Design Criteria For Water Systems Serving Less Than 1,000 People" (Draft) by Connecticut Department of Health Service, Public Water Supply Sections, Part 2.

amounts of wastewater. Nevertheless, since severe limitations to septic systems exist throughout the site, the overall risk of groundwater contamination would probably be greater in the conventional subdivision. A number of unnoticed, uncorrected septic problems on individual lots could pollute the groundwater as easily as a noticeable and quickly corrected failure of one (1) large system in one (1) location.

8. SIGNIFICANCE OF PEAK MOUNTAIN



(1) Peak Mountain is a traprock ridge of state-wide significance. It is part of a nearly contiguous, linear feature that traverses central Connecticut from Long Island Sound north beyond the Massachusetts line. In north/central Connecticut, traprock ridges are among the few "natural" features not heavily exploited by man. Peak Mountain provides habitat for numerous plants and animals and a "green belt" for migratory species such as hawks and other birds. A description of traprock ridges and their significance can be found in the attached pamphlet.

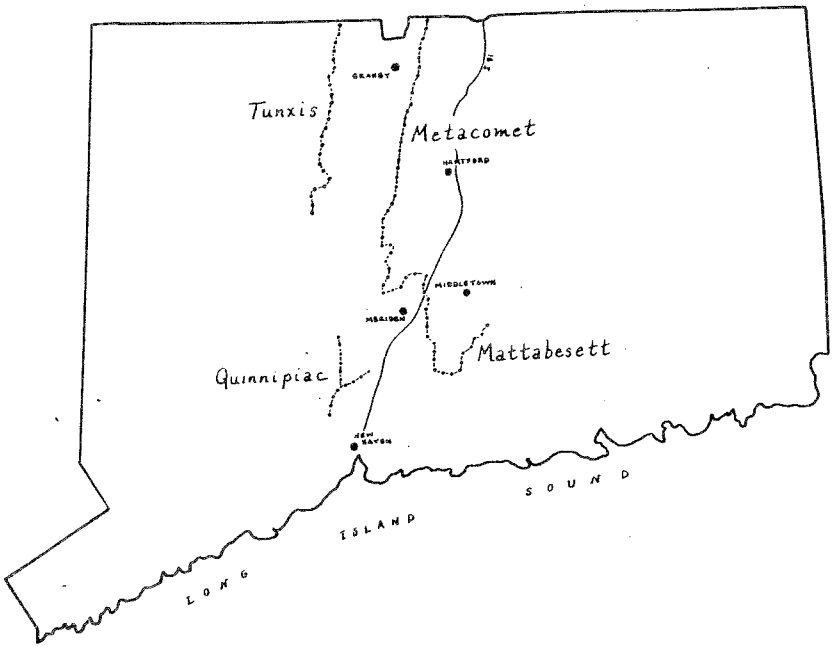
(2) To access the main portion of the property, a significant area of wetland will have to be crossed. This wetland receives runoff from the entire ridge system, eventually flowing into Stony Brook. Obstructions caused by road crossings, unless carefully planned and maintained, coupled with increased runoff from a dense subdivision, may significantly change the character of this wetland over time. This aspect must be closely reviewed by the appropriate agencies responsible for issuing permits to the developer.

(3) Peak Mountain provides a valuable recreational aspect to an area of overdevelopment and overuse of natural resources by man. Since the Metacomet Trail parallels the summit of this ridge, perhaps some type of conservation easement may be appropriate to provide protection to the trail and to the recreational potential that it provides.

(4) Although no species of special concern have been identified on this site by the Connecticut Natural Diversity Data Base, traprock ridges and their associated rocky summits, cliffs and talus have been identified as critical habitats for the State of Connecticut. In addition, many of the small wetlands and vernal pools on these ridges are important breeding areas for many reptiles and amphibians and until fully explored, may contain locations of some species of special concern.

Also included is a copy of a pamphlet entitled "Traprock Ridges", and the appendices from Cara Lee's West Rock to the Barndoor Hills -- The Traprock Ridges of Connecticut. Connecticut Geological and Natural History Survey, Guidebook #4, 1985.

Hiking Trails on Traprock Ridges in Connecticut



Geology

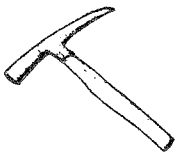
Colbert, Edwin H. *Fossils of the Connecticut Valley—The Age of Dinosaurs Begins*. Connecticut Geological and Natural History Survey. Bulletin #96. 1970.* As well as giving an excellent geologic history of the Central Connecticut Valley, this booklet describes the history of discoveries of fossils found in the Valley, including dinosaurs, plants and fish.

Joesten, Raymond and Sidney Quarrier. (ed.) *Guidebook for Fieldtrips in Connecticut and Southern Central Massachusetts*. New England Intercollegiate Geological Conference. 74th Annual Meeting. Connecticut Geological and Natural History Survey. Guidebook #5. This guidebook is a collection of articles which discuss specific geologic features found throughout the state. It gives current interpretations of geologic processes.

Hubert, J.F., A.A. Read, W.L. Dowdall and J.M. Gilchrist. *Guide to the Mesozoic Redbeds of Central Connecticut*. Connecticut Geological and Natural History Survey. Guidebook #4. 1978. This guidebook gives an overview of the history of the sedimentary and volcanic strata deposited in the Connecticut Valley during the Triassic and Jurassic periods. It describes specific locations in Connecticut that the reader can study with the aid of the guidebook.

Wyckoff, Jerome. *Rock Scenery of the Hudson Highlands and Palisades. A Geologic Guide*. Adirondack Mountain Club. Glens Falls, NY. 1971. A variety of geologic features associated with the traprock of New Jersey are described and profusely illustrated with photographs in this guidebook.

Geologist's rock hammer



** Publications that are part of the Connecticut Geological and Natural History Survey are available from the Natural Resources Center, Room 553, Connecticut Department of Environmental Protection, State Office Building, Hartford, CT 06106 Telephone: (203) 566-3540. A catalog of publications and maps is available.*

Ecology and Regional Natural History

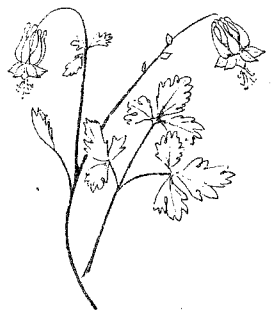
Cronon, W. *Changes in the Land*. Hill and Wang. New York. 1983. This book explores the modifications in the landscape made by the colonial settlers and contrasts them to those of the American Indians. It traces historical and cultural differences in land-use patterns and their effect on the environment.

Egler, F.E. and W.A. Neiring. *The Vegetation of Connecticut Natural Areas—The Natural Areas of the McLean Game Reserve*. Connecticut Geological and Natural History Survey. #3. 1967. This guidebook describes in detail the preserve that includes the Barndoor Hills. It discusses the distribution of vegetation found in the refuge and includes a useful plant list for the area.

Jorgensen, Neil. *A Sierra Club Naturalist's Guide: Southern New England*. Sierra Club Books. 1978. A comprehensive but readable guide to the ecology of Southern New England, this excellent book describes a variety of distinctive habitat types as well as touching on geology, wildlife and land-use history.

Jorgensen, Neil. *A Guide to New England's Landscape*. Barre Publishers. 1978. Since this book addresses a broader region, it is less specific than the Sierra Club guide to Southern New England. It will give the reader a sense for the entire New England region and is a good companion to Jorgensen's other guide.

Wild Columbine
(Aquilegia canadensis)



Wildlife

Craig, R.J. *The Rare Vertebrates of Connecticut*. USDA Soil Conservation Service Publication. 1979. Describes the distribution, habits and life histories of Connecticut's more unusual wildlife.

Preservation and Land Use Management

Ehrenfeld, D.W. *Biological Conservation*. Holt, Rinehart and Winston Inc. 1970. A textbook on the issues related to biological conservation, this book includes a variety of case studies as well as a general discussion of the problems of dwindling natural diversity.

Hoose, P.M. *Building an Ark: Tools for Preservation of Natural Diversity Through Land Protection*. Island Press, Covelo, CA. 1981. This book gives the rationale for preserving natural diversity through land protection. It gives step-by-step guidance on how a community group or organization could carry out land use preservation in a manner similar to that used by The Nature Conservancy.

McHarg, Ian L. *Design with Nature*. Published for the American Museum of Natural History. Doubleday and Co. NY. 1971. A creative, philosophical and ecological approach to land-use planning that has become a cornerstone of alternative strategies to unplanned development.

Recreation

Connecticut Forest and Park Association. *The Walk Book*. 1010 Main St. East Hartford, CT. The most complete source for maps of the maintained trails throughout the state.

Cooley, Susan D. *Country Walks in Connecticut. A Guide to The Nature Conservancy Preserves*. Appalachian Mountain Club and The Nature Conservancy. A guide to The Nature Conservancy preserves in the state, this book describes Onion Mountain, Higby Mountain and Bluff Head.

Hardy, G. and S. *Fifty Hikes in Connecticut. A Guide to Short Walks and Day Hikes Around the Nutmeg State*. Backcountry Publications. 1978. Each hike in this book is classified by difficulty, length and access. It includes interesting historical facts as well as best views and other highlights. Many of the hikes are along the traprock ridges.

Nichols, G.E. *Traprock-Rock Climbs in Connecticut*. The Alpine Club. NY. A complete introduction to the rock-climbing opportunities in Connecticut. Includes a geological history and a history of rock climbing as a sport.

Publications

Citizen's Bulletin is published 11 times a year by the Department of Environmental Protection. It includes features on natural history, regional history, natural resource policy and issues being considered by the Department. Subscriptions are available for $5.00 per year. Send a check to:

Citizen's Bulletin
State of Connecticut
Department of Environmental Protection Room 112
State Office Building
Hartford, CT 06106

Connecticut Woodlands features news on the activities of the Connecticut Forest and Park Association and is a good source of information on state, community and volunteer activities throughout the state related to forest and parks. Subscriptions are available for $5.00 per year. Send a check to:

Connecticut Forest and Park Association
1010 Main St. P.O. Box 389
East Hartford, CT 06108

Topographic Maps as a Resource

Nature Centers

West Rock Nature Center
P.O. Box 2969, New Haven CT 06515
(203) 787-8016

Located on Wintergreen Avenue at the foot of West Rock, in New Haven, this center has two rangers and an extensive "zoo" of native Connecticut wildlife. Call for information on programs and directions.

East Rock Center
East Rock Park
New Haven, CT 06511
(203) 787-8142

With a ranger station in College Woods at the base of East Rock, the naturalist/ranger in East Rock park provides a number of programs for the public. Call for information.

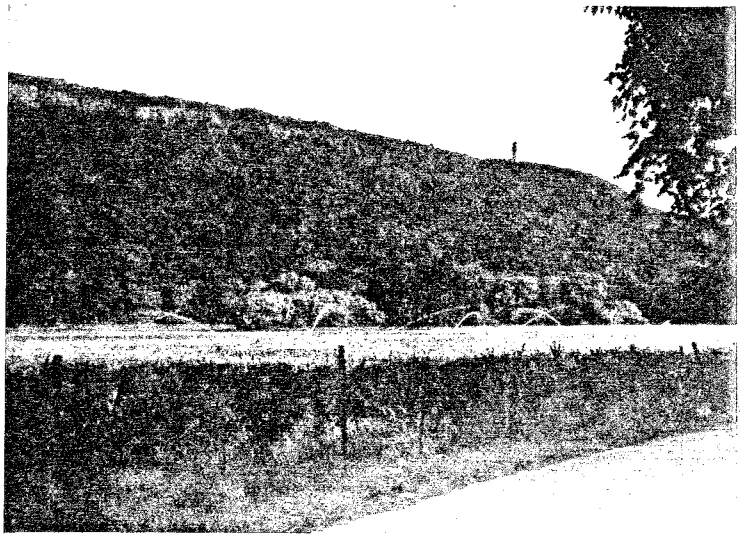
Roaring Brook Nature Center
70 Gracey Road
Canton, CT 06019
(203) 693-0263

Located near Onion Mountain, this center offers a number of natural history programs for school groups and the public. It has a small shop that is well stocked with natural history books relevant to the region.

Topographical maps are one of the best and most interesting guides to exploring a region. The following is a list of the State Parks that encompass traprock ridges, and the quadrangle maps that show them. These maps can be ordered singly from the Natural Resources Center, Room 553, Connecticut Department of Environmental Protection, State Office Building, Hartford CT 06106.

State Park	*Quadrangle Name*
Talcott	Bloomfield, Avon and Simsbury
Lamentation	Berlin
Trimountain	Durham and Wallingford
West Rock	Hamden
Sleeping Giant	Hamden and Wallingford
West Peak	Meriden and Middlefield
Sunset Rock	Plainville

TRAPROCK RIDGES



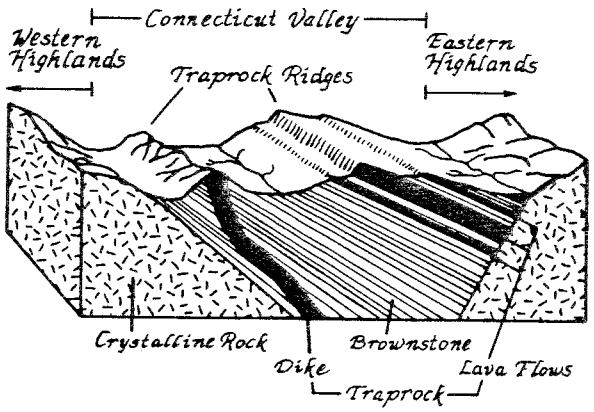
Talcott Mountain

Through central Connecticut and Massachusetts, Interstate 91 runs past a series of long, prominent ridges. These elongated mountains with their dramatic rust colored cliffs have long caught the eye of Connecticut's residents and visitors. Adrian Block, the first European to sail Long Island Sound and see the Connecticut coastline, named one of his anchorages Rodenberg (red mountain) for the great red cliffs that dominated the landscape. That anchorage is now the port of New Haven, and the mountains that so impressed Adrian Block are East Rock and West Rock. These landmarks, as well as Sleeping Giant, the Hanging Hills of Meriden, Talcott Mountain, and other mountains of Connecticut's Central Valley are traprock ridges, so named for the hard rock of which they are made.

The traveler who leaves the highways to explore these high ridges will be rewarded by an outstanding panorama of the wide Connecticut Valley, with its houses, roads, farms, and rivers. Close by, the observant walker will see the distinctive habitats of the traprock ridges, from the hardy plants of the exposed ridgetops to the lush forest growth of the lower slopes.

GEOLOGY

Two great geologic forces formed the traprock ridges: volcanism and erosion. 200 million years ago, when dinosaurs still roamed the earth, volcanoes forced out great flows of lava through long cracks in the floor of the Connecticut Valley. These volcanoes were not explosive, but rather were broad, liquid outpourings of lava. Three major lava flows covered the valley floor. Each one cooled and hardened into traprock (also called basalt) and was gradually covered by sand and mud eroded from the surrounding hills. Through time, these sediments were buried by new sediment and cemented into brownstone by the slow trickle of groundwater. The result was a massive layer cake of brownstone and traprock, assembled over millions of years.



geologic cross section of the Connecticut Valley

After the volcanic activity stopped, the whole region was fractured and tilted to the east. Since then, erosion has eaten away at the bedrock of the Connecticut Valley. Thousands of feet of brownstone have been washed to the sea, but the dense, hard, volcanic traprock eroded much more slowly, leaving the traprock layers as long ridge backs standing out far above the surrounding landscape.

Traprock is a dark, fine grained rock. When newly broken open it is dark grey, but after exposure to weathering, the iron contained in the rock rusts, causing it to turn a reddish color. The rock usually fractures into angular blocks or columns along a network of cracks that formed when the lava first cooled and shrank into rock.

ECOLOGY

The geology and topography of traprock ridges create a set of interesting ecological habitats. From east to west, most traprock ridges have a distinctive profile with a gentle slope rising along the tilted surface of the lava slab, an exposed summit with little or no soil, a steep rocky cliff with scattered small ledges and cracks, and a talus slope built up from boulders that have broken off the cliff.

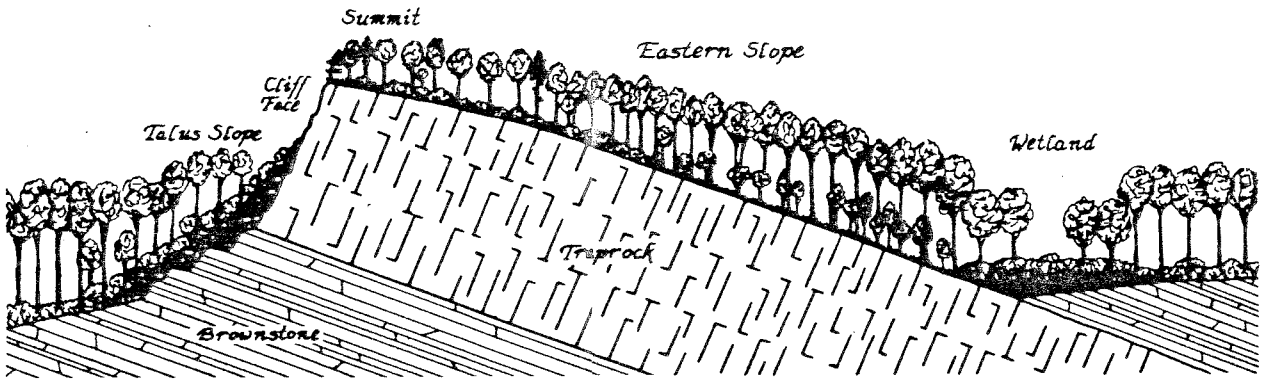
Each of these areas has its own association of plants and animals. At the base of the *eastern slope* grows a rich forest with tall tulip poplars or sugar maples and white ash. In the spring, one can sometimes find jack-in-the-pulpit, trillium, and other flowers growing on the forest floor. Wetlands form in level areas, with red maples, spicebush and mosses.

Further up the slope the forest becomes drier and more open. Oaks and hickories replace the tulip poplars, and mountain laurel and blueberries grow under the smaller, more scattered trees.

refreshing breezes, but these breezes further intensify the dryness of this habitat. Notable plants along the ridge are yellow foxgloves, birdfoot violets, late purple asters, staghorn sumac, and scrubby bear and chinquapin oaks.

The harshest environment for plants prevails on the *cliff face*, a zone almost devoid of soil and stored water. Yet seeds become lodged in crevices and germinate in tiny pockets of soil and dust. Some of the more interesting plants in this precarious environment are bluebells and woodsia ferns. Occasionally, black oaks, red cedars, hemlocks, or other trees cling to the cliff face.

The forested *talus slope* at the base of the cliffs supports the most diverse and lush plant growth of the traprock habitats. The forest cover is dominated by trees typical of northern areas such as sugar maple, ash, and basswood. During a brief period in the spring, when the trees are still leafless and sunlight warms the

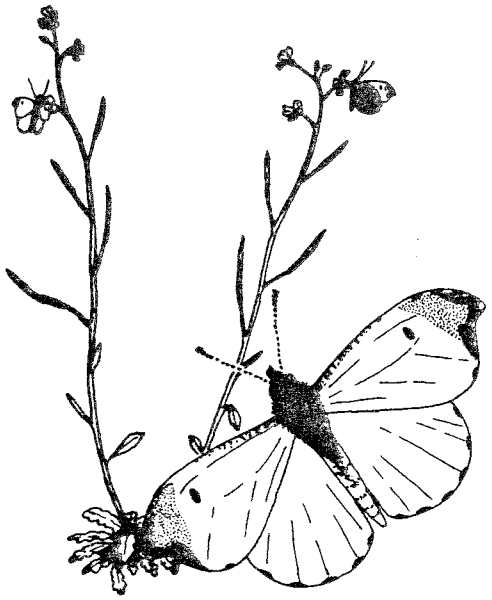


cross section of a traprock ridge

Only a few stunted trees grow on the *summit*. Red cedar, dwarf oak, hickory, and white ash are the species most commonly seen here. Although the ashes and hickories are less than half as tall, they may be as old as or older than their relatives down below. Several factors keep them from growing tall. Bare rock is exposed along much of the ridgeline, and the thin soils that cling to the rock retain little moisture. The ridge is exposed to the full force of west winds, and treetops often break in winter storms. During hot, humid days in the valley, the ledges are almost always subject to

talus, a host of flowers appears. These spring ephemerals mature and produce seed in this brief period. Most noteworthy are Dutchman's breeches, wild ginger, bloodroot, jack-in-the-pulpit, red trillium, and spring beauty.

Some talus slopes are too unstable to collect the rich soil necessary for dense plant growth. On the shifting rocks of Higby Mountain and the bare boulders beneath Sleeping Giant's chin few plants grow; only lichens, poison ivy, Virginia creeper, and some tenacious flowers such as herb robert.



falcate orange tip butterflies feeding on low rock cress; close-up of butterfly is twice life size

Because they are relatively undeveloped, traprock ridges harbor many animals. Deer, raccoons, and other woodland creatures live on the forested slopes. The wetlands and moist forest at the bottom of the slope also attract frogs and salamanders. The bare, sunny rocks and shaded crevices of the talus make good habitat for a variety of reptiles. One rarely sees these shy animals, but copperhead snakes, garter snakes, and black rat snakes occasionally make their homes in traprock talus and on the rocky ledges. Copperheads are venomous, but they are not aggessive, and their bites are rarely fatal.

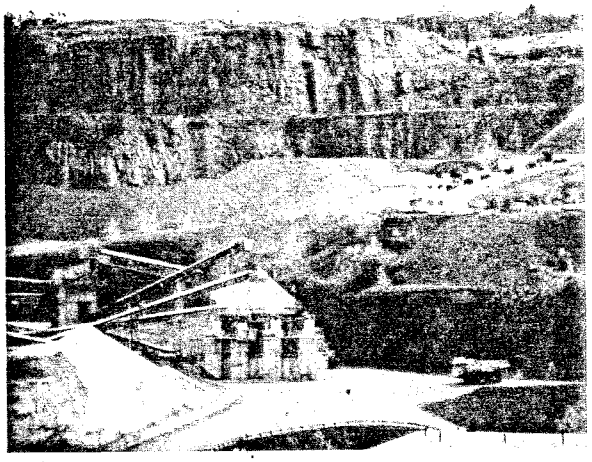
In addition to the common plants and animals already described, traprock ridges provide critical habitat for a number of rare species. Torrey's mountain mint, northern and southern wild comfrey, downy arrowwood, Virginia snakeroot, and the delicate purple hairgrass are all plants rarely seen in Connecticut, except on relatively undisturbed traprock ridges. Several types of butterflies are also found only on traprock ridges, including the falcate orange tip.

Rare and endangered species are so uncommon that the casual observer is unlikely to find them. One should never collect rare plants and animals since the removal of even a few individuals might endanger the entire population.

LAND USE

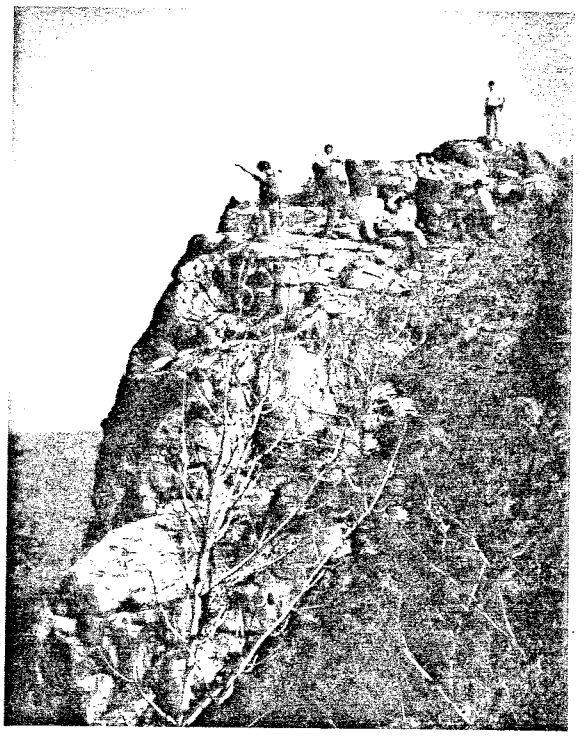
Historically, traprock ridges have been some of the least developed areas in the state. Because of their steep slopes and thin, rocky soils, traprock ridges were rarely cultivated, even around 1800 when over two thirds of southern New England was under the plow or in pasture. Steep slopes and shallow soils have also discouraged people from building houses on traprock (although recently the shortage of open space in the Central Valley has led to construction on some traprock ridges). The ridges were logged for timber and firewood during the last century, but since then the forest has grown back.

However, traprock ridges have by no means escaped use by people. The same qualities that make traprock resistant to erosion also make it an excellent material for several types of construction. From the mid 1800's to the present, traprock in this state has been quarried to produce gravel for building roads. Crushed traprock is also used to prevent erosion in streambeds and roadcuts, to help drainage, and is mixed with sand for use in concrete. Although they can be fascinating places, both active and abandoned quarries are dangerous because of loose rock.



traprock quarry

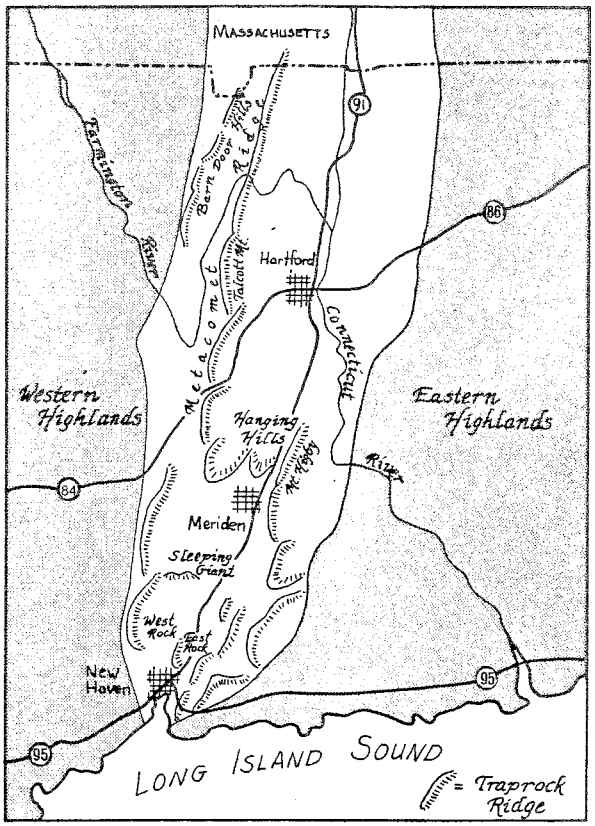
Traprock ridges are also heavily used for recreation. Some, like East Rock in New Haven, act as urban parks with planted lawns and easy road access. Others, like Sleeping Giant, Talcott Mountain, and West Rock State Parks have been left in a more natural state with a diverse network of trails.



Mount Higby, Middlefield

Recreation is an excellent use of these ridges, but it can bring problems. Trampling of the ridgetop may kill the plants, including rare species. In some areas graffitti on the rocks and littering have greatly detracted from the beauty of this habitat. Also, climbing around the talus slopes and cliffs can be dangerous because pieces of rock may break off the cliff and start rock slides in the slope below.

Most traprock ridges, whether or not they are officially designated as recreation areas, are heavily used by all kinds of people, from school children to bird watchers and cross country skiers to couples out for a quiet stroll. These people come because the view is superb and the area varied, interesting, and free from development.

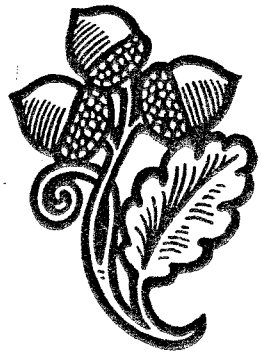


traprock ridges in the Connecticut Valley

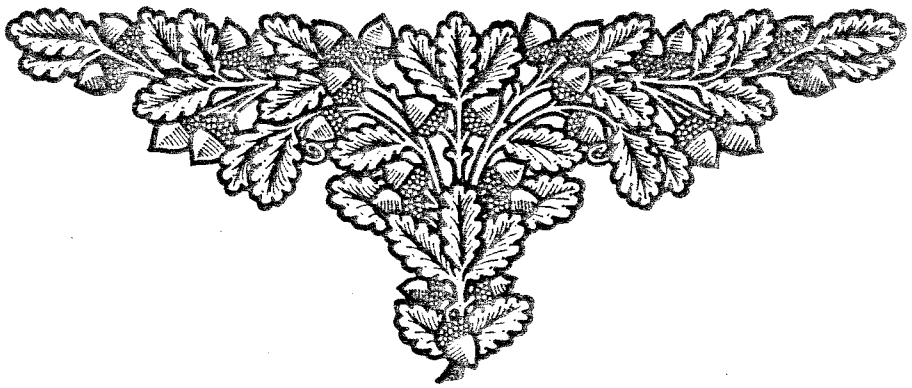
Traprock ridges are a critical habitat for several species of plants and animals. In addition they are areas of special geologic interest and high aesthetic value. For these reasons it is important that some of these ridges be protected in their natural condition. The Connecticut Natural Heritage Program in cooperation with a number of environmental organizations is working to identify and protect good examples of traprock ridges in the state. For more information about the Connecticut Natural Heritage Program, call (203) 566-3540 or write to:

Natural Heritage Program Coordinator
Natural Resources Center
Department of Environmental Protection
165 Capitol Avenue
Hartford, CT 06106

The preparation of this brochure was financed in part through a planning grant from the Department of the Interior, under the provisions of the Land and Water Conservation Fund Act of 1965.



9. VEGETATION



A. VEGETATION:

The proposed development is located on all or portions of six (6) properties for a total of ± 820 acres. The area consists of 630 acres of forestland and 190 acres of open land. There are five (5) broad vegetation cover types which include mixed hardwoods, softwood/mixed hardwoods, hardwood swamp, old field, and open land. Each cover type is described in detail below.

The commercial value of the wooded areas varies with the type, size and quality of tree growth on each of the six (6) properties. Some parcels contained stands of high quality, large sawtimber-sized trees which are of high value. Other parcels are either occupied by low value tree growth or have undergone a timber harvest that removed most of the valuable trees.

Of equal or greater value, is the area's aesthetic quality, watershed potential, diversified wildlife habitat, and passive recreation opportunities.

B. VEGETATION TYPE DESCRIPTIONS:

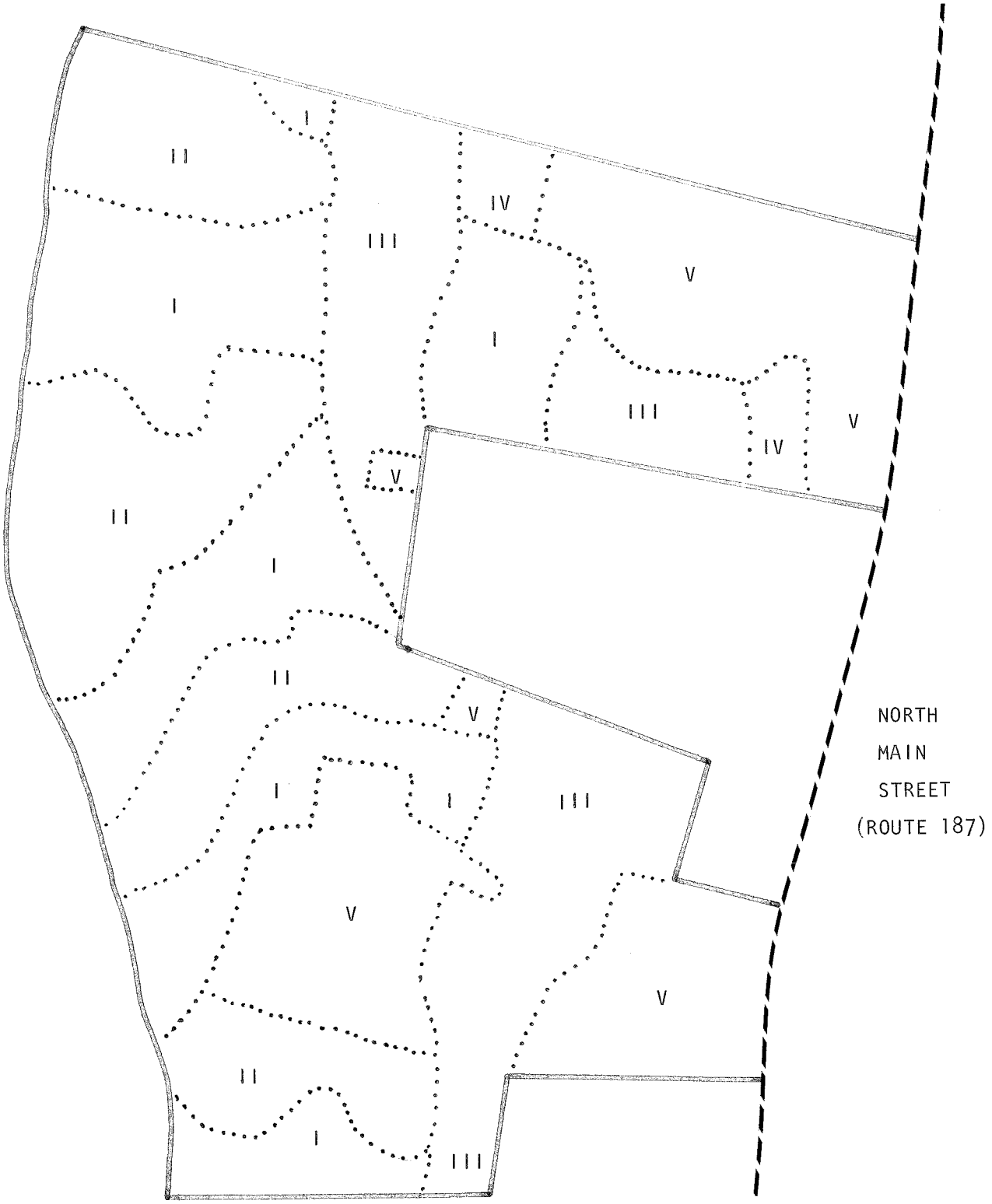
The following is a broad breakdown of the vegetation cover types. The types are directly influenced by either soil conditions, past management of the properties, or a combination of both. Historical use of the land also influences the present vegetation type and condition.

Type I - Mixed Hardwoods - The hardwood species present are white ash, aspen, beech, black birch, yellow birch, black cherry, hickory, red maple, sugar maple, yellow poplar, chestnut oak, red oak, and white oak. The softwood species present are hemlock, pitch pine, and white pine. The trees range in size from pole timber to large sawtimber. On drier sites, the tendency is to find, beech, black birch, white birch, hickory, chestnut oak, white oak and white pine. On moister sites, stands tend to contain ash, black cherry, yellow birch, red maple, sugar maple, yellow poplar, red oak, and hemlock.

Quality of the stems for timber production corresponds to the soil conditions in so much as the deeper well-drained soils tend to produce better timber.

Type II - Softwood/Mixed Hardwood - These are stands where hemlock or white pine make up a majority of the trees present. The hardwoods found in Type I may occur with these softwoods. As in Type I, the moisture availability of the site influences the occurence and growth of the softwood species. Hemlocks tend to favor moister soils, while on drier sites white pine and pitch pine may be more abundant.

Type III - Hardwood Swamp - These are areas with high water tables due to soil conditions or topography. The species present are ash, aspen, elm, black gum, red maple, and swamp white oak. The understory species present are spicebush and highbush blueberry.



VEGETATION

I - Mixed Hardwoods
II - Softwood/Mixed Hardwoods
III - Hardwood Swamp
IV - Old Field
V - Open Land

1" = 1000'

Type IV - Old Field - These areas are abandoned pasture or cropland that are reverting to woodland. The tree species present are red cedar, juniper, white pine, aspen, grey birch, red maple, black oak, and white oak. The shrub species present are speckeled alder, hawthorne, red stemmed dogwood, barberry, multiflora rose, and staghorn sumac.

Type V - Open Land - These are areas of active agricultural use.

C. LIMITING CONDITIONS AND POTENTIAL HAZARDS:

The natural factors that may limit operations on the area are:

the soils that have poor drainage
that are shallow to bedrock
or, that have steep slopes.

These soil characteristics may restrict equipment operation, predispose remaining trees to wind throw if openings in the canopy were made, and increase the potential hazard for sedimentation to occur in the watershed of Austin Brook. This hazard can be avoided by following the Best Management Practices (B.M.P.) concerning timber harvesting activities in such sensitive areas. A pamphlet dealing with timber harvesting and water quality is included in this section of the report.

D. MANAGEMENT CONSIDERATIONS:

The proposed development in it's present form, would eliminate the potential to place 600 acres of forestland under active management. The proposed construction would limit management to marketing the material that would be removed in the construction of roadways and building lots.

A public service forester or a private consulting forester may be of assistance in either the ground planning or the marketing of the wood products.

TREES ARE A CONNECTICUT
RENEWABLE RESOURCE

Managing a woodland improves the forest, provides better wildlife habitat, helps local industry, is a source of fuelwood, provides income to the landowner and is an important investment in the future.

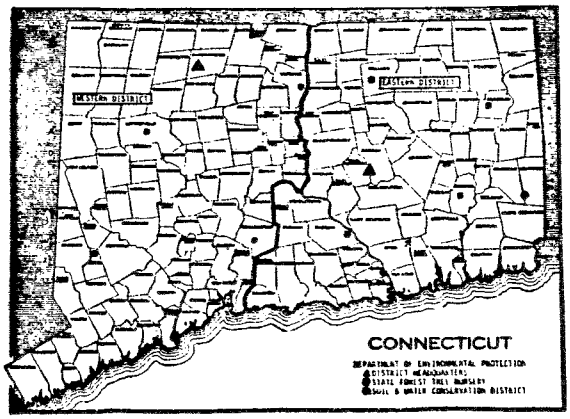
Printed as a service to the public by the
Connecticut Forest and Park Association, Inc.,
1010 Main Street, P.O. Box 389,
East Hartford, CT 06108.

LOGGING AND WATER QUALITY IN CONNECTICUT

A Practical Guide For Protecting Water Quality While Harvesting Forest Products

Developed by the Connecticut 208
Forestry Advisory Committee, 1982.

During the past few years, the importance of protecting water resources from pollution has been recognized at national, state and local levels of government. New plans and programs directed toward the control of water pollution are being formulated and implemented. Clearly, cooperation between the private sector and responsible government agencies, under the guidance of regulatory monitoring where necessary, is central to the attainment of clean water planning goals.



This document has been financed in part through a grant from the Environmental Protection Agency under the provisions of Section 208 of the Federal Water Pollution Control Act, Amendments of 1972, and was developed under the direction of the Department of Environmental Protection, State of Connecticut.

TABLE OF CONTENTS

INTRODUCTION

While some pollutants are easy to identify and control, others, particularly those associated with agriculture and forest management activities, are more difficult to address. In particular, soil loss from logging operations is now perceived by the public as a source of pollution in our rivers and streams. Loggers, foresters and landowners can expect increasing pressure from the public to do a better job of protecting forest soils and of minimizing the impact of harvesting activity on water resources.

In short, those involved with cutting sawtimber, cordwood or other forest products will have to do a better job of protecting natural resources voluntarily or the public will impose controls through state and local regulation!

In 1979, a field study and analysis of some eighty Connecticut logging operations was conducted. Detailed results of that survey are available at the State Forestry Unit, 165 Capitol Avenue, Hartford, CT, 06115 (566-5348). In brief, the study found no serious water quality degradation associated with forest management activities in Connecticut. It did point out, however, that site-specific problems could occur, particularly with sedimentation.

The recommendations presented in this pamphlet were developed by a statewide committee of interested citizens representing many natural resource interests, including the Wood Producers Association of Connecticut. The Committee, formed under the auspices of Section 208 of the Federal Water Pollution Control Act of 1972, suggests that these Best Management Practices (BMP's) are effective, are practical, but do require planning, and, most important of all, require cooperation of loggers, landowners and foresters.

Unusual situations may arise or pollution control measures other than those recommended here may be found. Common sense is most often the best guide to what is needed. Readers should realize that other forest management practices, such as use of pesticides or fertilizer, and forest fires can also lead to water quality problems but are not included in this publication.

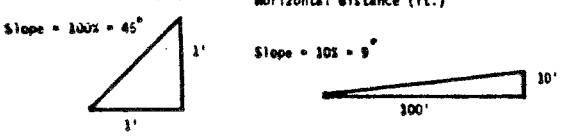
Robert L. Garrepy
State Forester

DEFINITIONS

Terms used in this pamphlet are defined as follows:

1. Access Road: generally a gravel surfaced or improved haul road upon which forest products are transported by truck or trailer. Skidding of logs along the road surface rarely occurs.
2. Skid Trail: roads or trails upon which logs are skidded from the stump to a processing area or landing. Skid trails may be used for only a few to a great many logs. Trail surfaces are rough and often subject to erosion.
3. Landing: loading area where logs are gathered, cut to length, sorted and loaded on trucks for transport to a mill.
4. BMP: best management practice -- a practical, economical and effective management or control practice which will reduce or prevent the generation of pollution.
5. Water Pollution: any condition which leads to poorer water quality. In forestry, pollutants may be sediment, logging debris, chemicals and soil nutrients or increased water temperature.
6. Erosion: the movement of soil by running water.
7. Sedimentation: soil and organic material deposited in low areas and water bodies by flowing water. There must be erosion to have sedimentation. Because sediment is material introduced into a water body or wetland, it is considered to be a pollutant.
8. Conservation Seed Mix: commercially available seed mixtures used to revegetate skid roads, loading areas, etc.. Plant species included germinate quickly, grow rapidly and are often attractive as food for a variety of wildlife. Additional information is available at the local County Soil and Water Conservation District Offices.
9. Slope Percent: the angle of a hill slope expressed in terms of "degrees" or "percent". A vertical rise of one foot in a horizontal distance of one foot equals a 100 percent or 45 degree slope.

$$\text{Slope percent} = \frac{\text{vertical rise (ft.)}}{\text{horizontal distance (ft.)}} \times 100$$



EROSION

The most common pollution problem associated with logging is erosion, the process by which the ground surface is worn away by water. The eroded material often finds its way into streams and water bodies as sediment. Most erosion comes from logging roads, skid trails, and landings. It almost always looks bad, may result in public complaints, and can lead to difficult operating conditions. Resulting sedimentation can create serious water quality problems.

1. Virtually all erosion causeo by timber harvesting in Connecticut occurs during logging operations or during the year following logging.
2. Effective erosion control measures do not require specialized equipment or knowledge. Regular logging equipment and common sense is all that is necessary.
3. In most cases, control of erosion enables more efficient operations and most certainly provides for improved public relations.

WATER PROBLEMS

Water that moves rapidly and water that does not move at all creates problems. The key to erosion control and efficient harvesting is keeping water from concentrating in confined areas on logging roads, skid trails and landing areas.

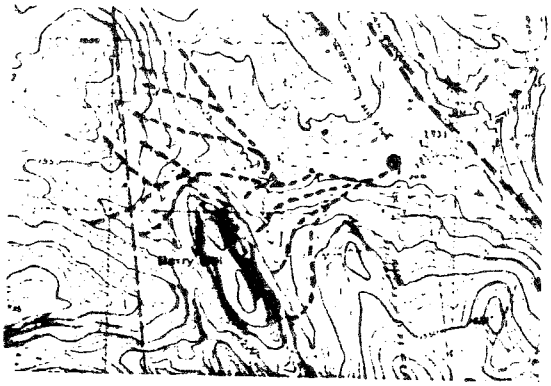
1. Confined, rapidly-flowing water causes erosion and gullying.
2. Confined, non-flowing water creates mud holes and may lead to serious rutting, but does not cause erosion.
3. Deterioration of logging roads, skid trails and landings causes difficult working conditions, increased costs of operations and criticism from landowners and the public.

Control of water should be a major consideration during the entire harvesting operation:

1. During the planning process (and every job should be planned).
2. During logging.
3. After logging is completed.

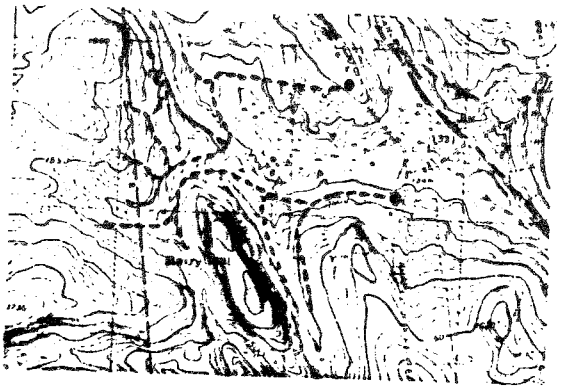
I. PLANNING THE JOB

Typical logging layout - unplanned



Note skid trails going straight up and down hills and crossing brook and the location of the landing adjacent to a swampy area -- many potential water problems.

Layout planned prior to logging



Planning eliminated stream crossings, reduced the steepness of skid trails and, by utilizing two landings, skidding distances were greatly reduced.

LAYOUT OF SKID TRAILS

Proper placement of logging roads, skid trails and landings is the most effective method of controlling water problems and erosion associated with forest products harvesting. Before beginning an operation, a harvest plan should be made. A plan may be as simple as a walk through the woodlot to identify potential problem areas, or as detailed as a proposal complete with maps and specific instructions. In any instance, the time spent in planning will pay for itself in more efficient operations.

STEEP SLOPES

Skid trails and logging roads should avoid slopes exceeding twenty percent, except for short distances. (A skidder will coast on slopes of five - ten percent; logs will roll on slopes steeper than fifteen percent.

FLATS OR NO SLOPE

Avoid wet flats (less than two percent slope), swales, benches or other areas where water cannot be drained away, or log these sections when frozen or dry. Side hill locations with slope sufficient for controlled drainage are preferred for skid trail routes.

WET LANDINGS

Landings should be located on well-drained soils, with a slight slope away from the access road. Wood chips, bark or sawdust can improve operating conditions, but should not be used as a substitute for a proper location.

STREAM CROSSINGS

Avoid crossing brooks and streams when practical. However, there are so many water courses that some crossings are inevitable. Locate crossings at right angles to stream flow and avoid steep approaches to the stream bed. If possible, a sediment-catching pool, either natural or man-made, should be located immediately downstream from a skid trail crossing.

POOR LOCATION

This poorly-located crossing will continue to cause water quality problems long after the logging is completed.

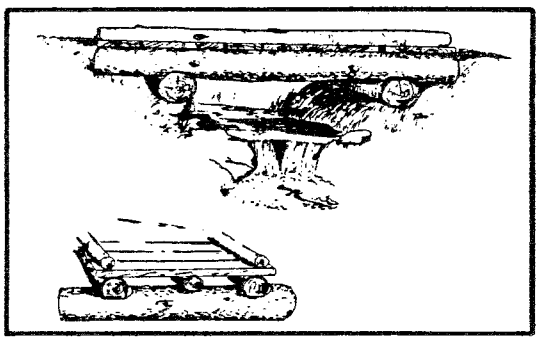
GOOD LOCATION

Hard stream bottom minimizes bed disturbance. Gentle approach slopes lessen bank erosion. Rock taken from old stone fences can improve crossing sites so long as the stream channel is neither altered or dammed. At completion of operations, stream banks and approaches should be graded to approximate natural conditions.

BRIDGING

If a suitable stream crossing site cannot be located, a simple log bridge should be used. Log corduroy (crossing on logs piled in stream channel) is not usually recommended because of the potential for damming water and subsequent uncontrolled washout. Culvert installation may require a permit for depositing fill in a wetland area. Streams too large to bridge probably should not be crossed at all. All temporary structures used in stream crossing must be removed at completion of operation.

SIMPLE BRIDGE



Bridge must be wide enough to accept the largest turn to be skidded over it. Bumper logs may aid in keeping material from slipping off bridge. Plank deck is relatively inexpensive, safe and helps prevent shifting of support logs.

BUFFER STRIPS

To protect water courses further, buffer strips of undisturbed land should be left between the water and skid trails, roads and landings. Depending on slope, buffer strips should be from 30 to 100 feet in width. Eroded material will settle out on these areas before reaching the water course. Some cutting may be allowed in a buffer strip, but the use of a skidder or tractor in the area should be avoided.

II. HARVESTING OPERATIONS

During active harvesting operations, the potential for damage to logging roads, skid trails and landings from water erosion is greatest. Continual soil disturbance by logging equipment creates a condition where even light rain can cause erosion. Control measures must minimize the amount of soil disturbance and erosion and prevent soil that is eroded from entering water courses as sediment.

HAUL ROADS

Most roads in Connecticut are publicly maintained. Loggers who must construct access roads to landings should be sure that there is adequate side drainage, that sufficient gravel is used to provide a firm travel surface, and that there is enough crown to prevent standing water. Sediment basins should be constructed where roadside ditches approach water courses.

SKID TRAILS

Since skid trail surfaces are subject to constant disturbance, construction of water control measures on them is usually not practical.

The keys to skid trail maintenance are:

1. Minimize the amount of water reaching the trail, and
2. get water off the trail as quickly as possible.

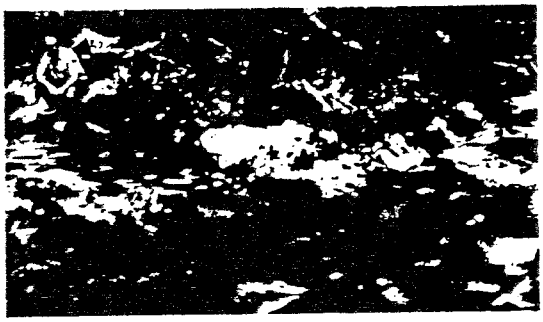
The best methods for controlling water on skid trails are:

1. proper location of the trails in the planning process,
2. keeping natural drains open, and
3. improving drainage where necessary.

NATURAL DRAIN - INCORRECT

The area shown above could have been improved greatly if the natural drain pattern was kept open. Unless water is removed, a mud hole will only get worse.

NATURAL DRAIN - CORRECT



Periodic cleaning of debris and mud kept this natural drain open and prevented the development of impassable conditions

WATER BARS

A water bar is a ridge of soil and stone, often reinforced with a log, constructed at an angle to the slope of a skid trail, which makes water run off the side of a trail rather than running down it.

To be effective, a water bar must be correctly angled, be high enough to prevent overtopping by water flow and be broad enough to sustain some traffic use.

Water bars are easy to install with a blade of a skidder or tractor. Spacing of water bars depends on the steepness of slope. While there are several formulas for determining spacing, common sense dictates that diversion is necessary whenever there is an uninterrupted grade of 80 - 100 feet in length. However, traffic on a main skid trail will destroy water bars quickly, so other drainage systems are preferable during operation.

2. Avoic wet areas. No tree is worth getting stuck. Work in an alternate area until wet locations dry out in the summer or freeze in the winter.

3. Take special care in buffer zones near water bodies. Trees should be felled away from water. Any that fall into water courses should be removed, tops and all.

4. Use the winch! While winching may require more time than driving a skidder to each log, site disturbance, particularly in buffer zones and wetlands is minimized with judicious winch use.

5. Avoid driving up steep slopes. While a skidder may well traverse a 30-degree incline, spinning wheels and repeated trips create ruts which lead to erosion.

6. Stick to established skid trails. Too often a wet spot develops and the skid trail is moved a few feet to the side to go around the problem. Water then fills in the new trail and another move is made, eventually resulting in major disturbance. Locate original skid road to avoid wet areas and, if necessary, relocate the trail far enough from the problem location to avoid "multiple-lane" situations.

LANDINGS

Inadequate landing facilities are often the "bottleneck" that restricts a harvesting operation. Landing areas should be:

1. Of adequate size: use two landings if one is not large enough.

2. Set back from public roads: a screen of uncut forest will minimize complaints.

3. Well-drained: building a short access road to a suitable site is less expensive in the long run than fighting a wet area closer to a public road.

4. Clean: short blocks, branches, oil cans, excess scrap metal and tires can take over a landing. Clean up trash and push back sawdust and blocks on a regular basis. A clean landing is a better work area and provides a more attractive appearance for the public.

5. Free of oil dumps: crankcase drainings and hydraulic oil spills can pollute nearby water for years. Be careful of spills. Dispose of old lubricants in an approved manner. Store in leakproof metal drums and return to a collection point (service station or auto repair shop) for recycling.

DRAINAGE DIPS

A drainage dip is a depression created in a skid trail for the specific purpose of slowly diverting the flow of water. The dip may be 20 - 40 feet in length, with gradual slopes and the deepest point approximately one foot below the average grade line. Constructed with the blade of a skidder or tractor, a dip does not interrupt traffic, wears at the same rate as the rest of the trail and, if the runoff end is kept clear, will serve as an effective and long-lasting drain.

DRAINAGE DIP DESIGN

Spacing Between Drainage Dips

Road Grade (Percent)	*Approximate Distance Needed Between Dips (feet)*
1	500
2	300
5	180
10	140

Drainage dips will not work on a steep slope because water runs over the low side, but they do work well at the foot of a slope.

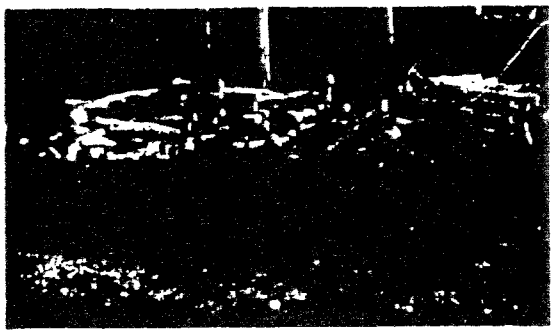
IMPORTANT: Proper location of skid trails minimizes the need for water control structures during the operation.

RECOMMENDED PRACTICES

The best skidder operation in the world will create unnecessary disturbance if the trees cut are not readily accessible. The timber faller must be familiar with the skidder capabilities. Both faller and skidder operator should know the cutting area layout and plan for harvesting. A forester involved with timber marking should know the extraction problems faced by harvesting crews. To minimize unnecessary disturbance, the following suggestions are offered:

1. Trees marked for harvesting must be accessible. Enough stems must be removed to allow the faller to get trees down and the skidder to remove them. Cutting an additional tree is usually preferable to requiring an additional skid trail.

WELL-MANAGED LANDING



Note there is adequate space to drop a turn of logs, to buck and sort and to load a truck. The surface area is dry and uncluttered.

III: COMPLETING THE JOB

Like the planning phase of logging operations, closing down a logging job requires time and effort that does not make money and may, in fact, cost some. However, the condition and appearance of a woodlot after cutting makes the reputation of the logger. When someone leaves a mess, the word gets out quickly. Conscientious loggers rarely have trouble finding woodlots.

Any harvest operation creates disturbance, but the area should be left in a condition that insures no continuing effects after the loggers have gone. Water, of course, is still the major concern. A skidder rut can become a gully. Tree tops in streams may cause channel bank erosion. Sediment from landings may damage streams and ponds.

After the logging operation is completed, begin immediately to install erosion control measures. Skid trails, roads not suited to continued use, and landings should be "put to bed":

1. Back-blade major skid trails to fill in ruts and smooth the surface. It takes little time and does much to soothe the landowners feelings.

2. Install water bars where necessary and clean out drainage dips and natural drain areas. It is better to have more drainage than not enough.

3. Place brush and slash in the skidway, in ditches or in eroded areas to slow water flow and retain sediment.

4. Culverts, bridges or other temporary structures placed in water courses should be removed.

5. Grade approaches to stream crossings to approximate original conditions.

6. Clean-up and grade landings. No logging debris or trash should be left and the landing surface should be graded so water flows away from the access road.

7. Lime and seed the landing, approaches to stream crossings and steep skid trail sections. Annual rye or a commercial mix of conservation plant species gives excellent, quick cover, providing additional erosion protection and making the area look more attractive. Wood chips, sawdust and old hay make excellent cover material for critical areas, providing protection from erosion until natural vegetation becomes established.

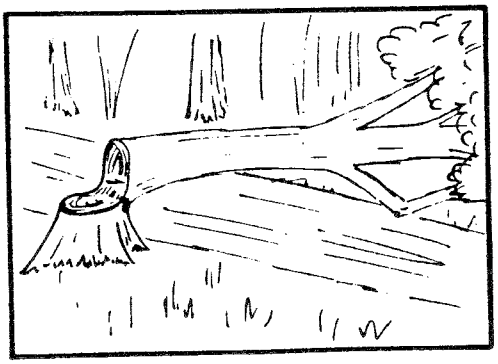
   Conservation plant mixes, available at farm supply stores, also provide food for and cover for wildlife -- the landing then becomes a resource benefit.

8. PREVENT CONTINUING ACCESS unless part of the skid trail system is to be used on a regular basis. Heavy use by motorcycles and horses can have an effect more detrimental than the original logging. An effective barrier is a medium-sized tree felled so the top is in the skid trail and the butt is still partially connected to the stump. The tree cannot be moved without additional cutting and stays partially alive for a long period. Because of potential hazard liability, chains and cables are not recommended for gates.

REMEMBER: a small amount of extra effort at the end of the harvesting operation can go a long way in protecting the soil and water and in maintaining good landowner and public relations.

LANDING: "PUT TO REST"

TREE-TOP TRAIL BARRIER



ACKNOWLEDGEMENT

This guide was developed through the cooperative efforts of the Connecticut 208 Forestry Advisory Committee. Group members represent public and private resource management agencies, conservation groups, industry, private landowners and the public at large. The intent of the publication is to promote better harvesting practices in Connecticut woodlands.

Guidelines do not solve problems -- people do. However, it is hoped that by accepting and adhering to these recommendations, foresters, loggers and landowners, working together, can avoid situations that create a need for local regulation of the industry.

Additional technical advice and information on best management practices or other aspects of forest products harvesting may be obtained from:

State Forester's Office
165 Capitol Avenue
Hartford, CT 06115
tel. 566-5348

Eastern District Hdqrs., DEP
209 Hebron Road
Marlborough, CT 06447
tel. 295-9523

Western District Hdqrs., DEP
P.O. Box 161
Pleasant Valley, CT 06063
tel. 379-7095

State Forest Tree Nursery
RFD #1, Box 23A
Voluntown, CT 06384
tel. 376-2513

Carol Youell
RC&D/Extension Forester
Box U-87
University of Connecticut
Storrs, CT 06268
tel. 486-2839

Assistance and advice concerning soils, erosion control, drainage systems, and construction of roads and ponds may be obtained from the Soil and Water Conservation District in your county:

Fairfield County S&WCD
Route 6, Stony Hill
Bethel, CT 06801
tel. 743-5453

Litchfield County S&WCD
Agricultural Center
Litchfield, CT 06759
tel. 567-8288

New Haven County S&WCD
Agricultural Center
322 North Main Street
Wallingford, CT 06492
tel. 269-7509

Hartford County S&WCD
340 Broad Street
Windsor, CT 06095
tel. 688-4946

Middlesex County S&WCD
Extension Center
Haddam, CT 06438
tel. 345-4511

New London County S&WCD
562 New London Turnpike
Norwich, CT 06360
tel. 887-4163

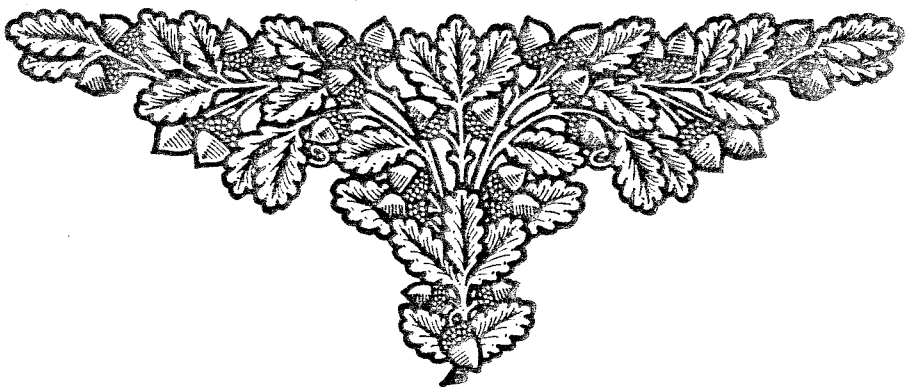
Windham County S&WCD
Agricultural Center
P.O. Box 112
Brooklyn, CT 06234
tel. 774-0224

Tolland County S&WCD
Tolland Agricultural Center
24 Hyde Avenue
Vernon, CT 06066
tel. 875-3881

USDA Soil Conservation Service
Mansfield Professional Park
Route 44A
Storrs, CT 06268
tel. 429-9361

NOTES

10. WILDLIFE HABITAT



The study site consists of four (4) major wildlife habitat types. These types are mixed hardwoods, softwood/mixed hardwoods, openland and wetlands.

A. HABITAT TYPES

A. Mixed Hardwoods

This habitat type consists of a variety of hardwood species including red oak, white oak, hickory, red maple, sugar maple, beech black birch, yellow birch, cherry and aspen. There are some conifers present composed of hemlock, pitch pine and white pine.

Wildlife typically utilizing such sites include ruffed grouse, gray squirrels, flying squirrels, white-tailed deer, woodpeckers, various passerines, raccoon, fox, and a great variety of non-game species.

B. Softwood/Mixed Hardwoods

This forest type has the same hardwood species as in the mixed hardwood type, but the majority of the area is dominated by hemlock and pine.

Wildlife species present are similiar to those found in mixed hardwoods in addition to owls, accipiters, red squirrels, chickadees, ruby-crowned and golden-crowned kinglets, and black-throated blue warblers.

C. Openland

This habitat type consists of reverting fields and active agricultural lands. Reverting fields are abandoned pasture and cropland, and presently are comprised of red cedar, juniper, pine, aspen, birch, red maple, alder, hawthorne, barberry, multiflora rose, sumac and various herbaceous species. The active agricultural fields presently are being utilized for hay.

Wildlife frequenting such habitat types include white-tailed deer, turkey, grouse, fox, rabbits, raccoon, meadowlark, bluebirds, cedar waxwings, sparrows, raptors and numerous other non-game species.

D. Wetlands

This type consists of seasonally flooded, forested wetlands; comprised of red maple, ash, aspen, elm, and swamp white oak. The dominant understory species are spicebush and highbush blueberry.

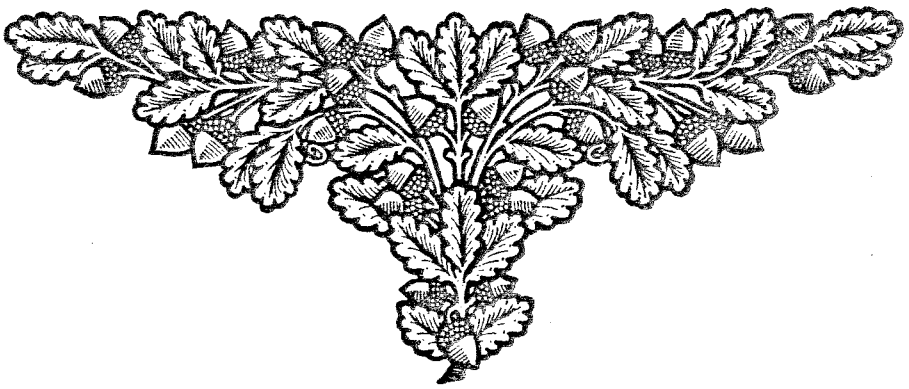
Wildlife utilizing such wetland sites include white-tailed deer, woodcock, skunk, raccoon, woodpeckers, passerines and various amphibians and reptiles.

B. DISCUSSION

If the project is developed as proposed, essentially all non-urban wildlife will be eliminated. This will occur through the direct loss of habitat due to buildings, roads, driveways, parking areas, and recreational facilities. Another loss of habitat is 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 will drive the less tolerant species from the site, even in areas where there has been no physical change.

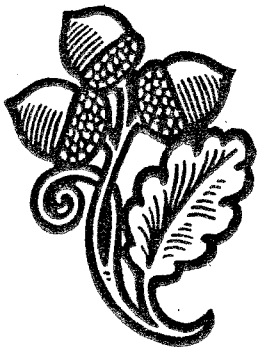
If at a later date, various project alternatives are proposed and/or wildlife mitigation is addressed, the DEP, Western District Office -- 485-0226 will be happy to provide input.

11. FISHERIES HABITAT

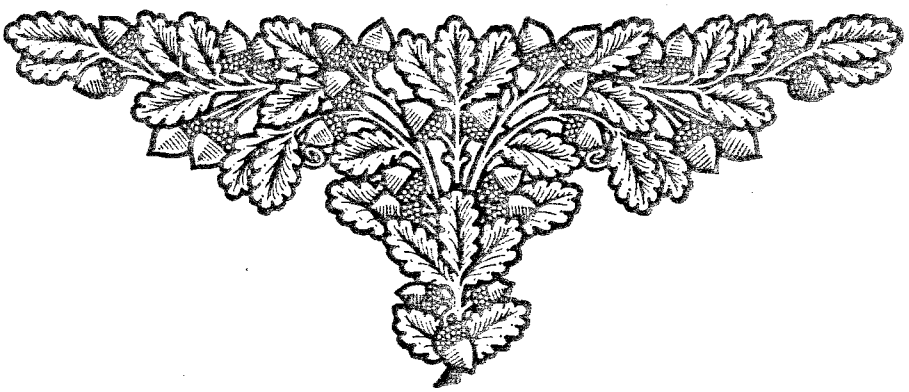


There is presently no important fisheries habitat located within the proposed development area. If the development is approved and small detention ponds constructed, then fisheries concerns and recommendations can be addressed.

The State of Connecticut, DEP has been stocking adult brown and brook trout in Stony Brook which is located immediately adjacent to this parcel. This particular section of Stony Brook is the headwater of the stream and the wetlands located on the site are very likely the source of its water. This brook is fairly slow moving and open, downstream from this area. Any warming of water due to a reduction of flow, can result in the destruction and/or reduction of the existing trout habitat downstream. Any significant changes to the wetland areas on the site or water table would very likely have severe consequences downstream. Without proper erosion control, siltation and sedimentation occurring from the site due to tree cutting, and earth moving, could potentially impact the stream. Therefore, any proposed development of the site should take into consideration the fragile balance between the downstream areas and the headwaters which feed those areas and take all possible precautions to protect and safeguard them.



12. NOISE IMPACTS



The main concern is the noise exposure that residents of the Planned Residential Development would receive as a result of aircraft operations occurring at Bradley International Airport. Bradley's Runway 15-33 is approximately 2.5 miles away with flight tracks passing over the northwest part of this parcel.

An in-depth study of the noise environment surrounding Bradley was done in 1981. Most of this information is taken from that study which was submitted to the Connecticut Department of Transportation (ConnDOT) in May 1981.

The "1979 Basic Case" noise contours were taken from the ConnDOT report and applied to a map which shows the location of the proposed Planned Residential Development. (see Noice Contour Map.)

Approximately one third (1/3) of the parcel lies within the 65 L_{dn} contour. Most of the remainder of the parcel lies within the 60 L_{dn} contour. Under FAA guidelines (see map) land in the 60 to 65 L_{dn} contours is considered to be in a "moderate exposure" class. Under HUD guidelines, it would be considered "normally acceptable". It is suggested that Land Use Controls should be considered when land is in these categories.

In addition, under standards being considered by the U. S. EPA and the American National Standards Institute (see attachment), residential land exposed to noise in 60 to 65 L_{dn} range would be classified "Marginally Compatible".

Chapter Six (6) of the ConnDOT report contains recommendations for "Off Airport" land use controls. A copy of the section of that chapter which applies to East Granby is included in this part of the report.

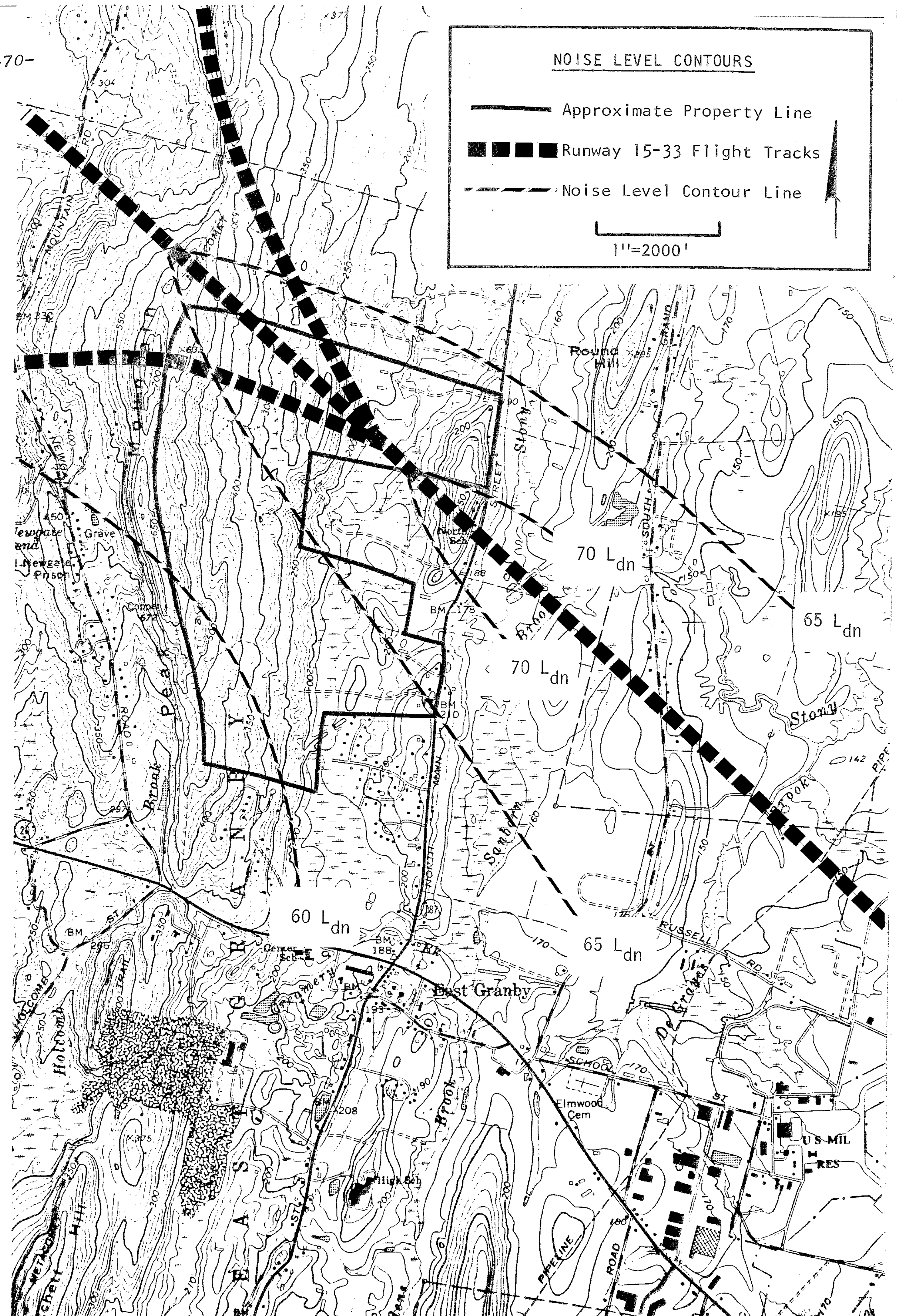
In view of the subject parcel's exposure to aircraft noise resulting from its location under flight tracks of Bradley's Runway 15-33, the Noise Impact Team member has serious reservations regarding its development for residential use.

If however, the Town decides to permit the residential development of this parcel, it is recommended that special consideration be given to the imposition of noise mitigation requirements on the developer. These could include:

(1) require "soundproof" construction of homes in the parcel

(2) require that potential home buyers be advised that the property is located in an aircraft noise impact area, and

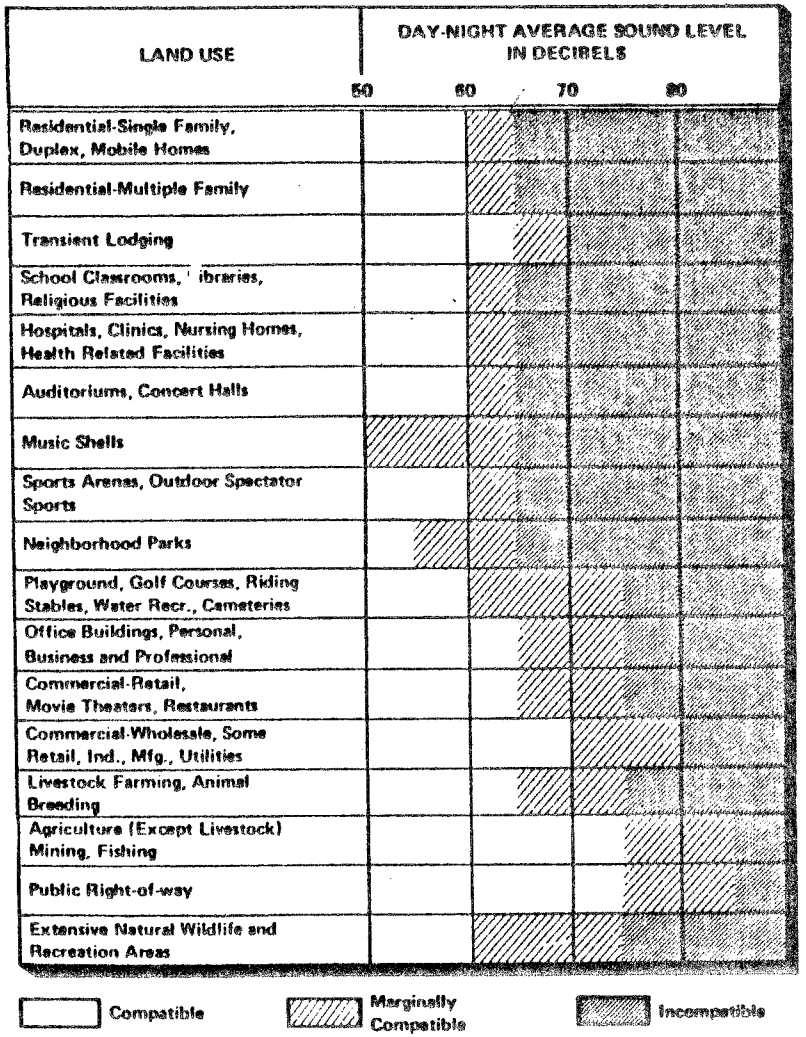
(3) impose special subdivision requirements as described in the attachments (pages 6-10 and 6-11).


NOISE LEVEL CONTOURS
Approximate Property Line
Runway 15-33 Flight Tracks
Noise Level Contour Line
1"=2000'
70 L_{dn}
65 L_{dn}
70 L_{dn}
60 L_{dn}
65 L_{dn}
Round Hill
Stony
Newgate Prison
Grave
East Granby
Elmwood Cem
U S MIL RES
High Sch
RUSSELL RD
SCHOOL
Sanborn
Brook
Holcomb
PIPELINE
ROAD

LAND USE GUIDANCE CHART: AIRPORT NOISE INTERPOLATION

NOISE EXPOSURE CLASS	INPUTS: AIRCRAFT NOISE ESTIMATING METHODOLOGIES				HUD NOISE ASSESSMENT GUIDELINES	SUGGESTED NOISE CONTROLS
	L_{dn} DAY-NIGHT AVERAGE SOUND LEVEL	NEF NOISE EXPOSURE FORECAST	CNR COMPOSITE NOISE RATING	CNE_L COMMUNITY NOISE EQUIVALENT LEVEL		
MINIMAL EXPOSURE	0 TO 55	0 TO 20	0 TO 90	0 TO 55	"CLEARLY ACCEPTABLE"	NORMALLY REQUIRES NO SPECIAL CONSIDERATIONS
MODERATE EXPOSURE	55 TO 65	20 TO 30	90 TO 100	55 TO 65	"NORMALLY ACCEPTABLE"	LAND USE CONTROLS SHOULD BE CONSIDERED
SIGNIFICANT EXPOSURE	65 TO 75	30 TO 40	100 TO 115	65 TO 75	"NORMALLY UNACCEPTABLE"	NOISE EASEMENTS, LAND USE, AND OTHER COMPATIBILITY CONTROLS RECOMMENDED
SEVERE EXPOSURE	75 & HIGHER	40 & HIGHER	115 & HIGHER	75 & HIGHER	"CLEARLY UNACCEPTABLE"	CONTAINMENT WITHIN AIRPORT BOUNDARY OR USE OF POSITIVE COMPATIBILITY CONTROLS RECOMMENDED

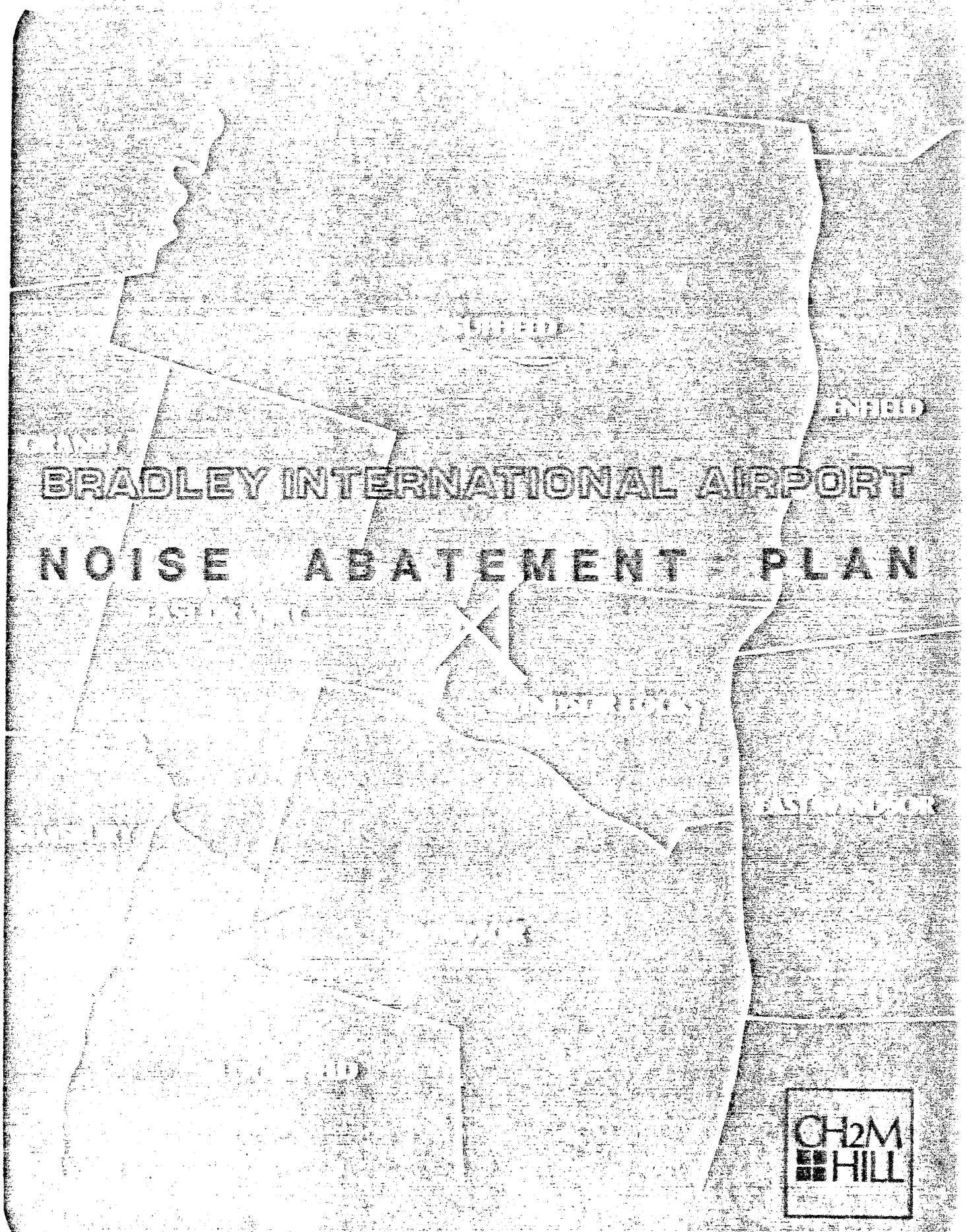
SOURCE: AIRPORT LAND USE COMPATIBILITY PLANNING, DOT/FAA 1977



LAND USE COMPATIBILITY WITH DAY-NIGHT AVERAGE SOUND LEVEL AT A SITE FOR BUILDINGS AS COMMONLY CONSTRUCTED

Source: Standards under consideration by the U.S. Environmental Protection Agency and the American National Standards Institute.

SAMPLE FEDERAL GUIDELINES


BRADLEY INTERNATIONAL AIRPORT
NOISE ABATEMENT PLAN
ENFIELD
CH2M HILL

CHAPTER 6 OFF AIRPORT LAND USE CONTROL

The Noise Abatement Plan eventually will be useless unless effective land use controls are instituted near Bradley. Residential development is proceeding within many of the noise-exposed areas, and indications are that it will continue. New residential subdivisions are evident in noise-exposed areas, more are under construction, and, still more are planned. The urban form of the area encourages residential development and there are no disincentives to the local towns to discourage such development. Remedies to this situation will not be quick, easy, or inexpensive; but effective land use controls are the most critical element of the Noise Abatement Plan.

Sufficient enabling legislation exists to allow each town near Bradley to adopt airport zoning regulations. Section 15-91 of the Connecticut statutes reads, in part:

> *"...(a) Every municipality having within its territorial limits an area within which...measures should be taken for the protection of airport approaches, shall adopt, administer, and enforce ...airport zoning regulations...which shall divide the area into zones and, within such zones, specify the land uses permitted, and regulate and restrict the height to which structures and trees may be erected or allowed to grow...". (emphasis added).*

The law goes on to say that the State may adopt such zoning if the municipalities do not. A model ordinance for such zoning regulations is provided at the end of this chapter. However, wholesale adoption of special zoning responsive only to the airport is not considered a realistic remedy for the situation near Bradley.

Another approach to off-airport land use is directed to the relief of liability and is contained in the Federal Aviation Safety and Noise Abatement Act of 1979, Public Law 96-193 (49USC2102). Section 107 of that Act reads in part:

> *"(a) No person who acquires property or an interest therein after the date of enactment of this Act in an area surrounding an airport with respect to which a noise exposure map has been submitted under section 103 of this title shall be entitled to recover damages with respect to the noise attributable to such airport if such person had actual or constructive knowledge of the existence of such noise exposure map...*
>
> *(b) For purposes of this section, constructive knowledge shall be imputed, at a minimum, to any person who acquires property or an interest therein in an area surrounding an airport after the date of enactment of this Act if—*
>
> *(1) prior to the date of such acquisition, notice of the existence of a noise exposure map for such area was published at least three times in a newspaper of general circulation in the county in which such property is located; or*
>
> *(2) a copy of such noise exposure map is furnished to such person at the time of such acquisition."*

While this approach helps to relieve some legal problems, it does nothing to relieve noise exposure. Nevertheless, the warning and notice to prospective buyers may be the only practicable relief than can be expected near Bradley.

The situation in each affected town is addressed below together with specific recommendations for actions by the individual towns and the State. The Bradley Master Plan provides considerable material addressing mechanisms for off-airport land use control and background related to the specific towns. The material presented here is intended to be in addition to that presented in the Master Plan.

6.4 EAST GRANBY

The town of East Granby is severely impacted by aircraft noise, and fully 53 percent of all aircraft departing Bradley will pass over East Granby from both RW 24 and RW 33. Approximately 75 percent of the town's land area is exposed to 60 Ldn or greater. The extent of this exposure requires that aircraft noise be a factor in the development of the town.

The Bradley Master Plan recommends that two areas within East Granby be rezoned from residential to agricultural, and that only multiple-unit dwellings be allowed within the town center. The East Granby Future Land Use Plan supports multiple units in the town center but does not support the zoning conversions. East Granby zoning and aircraft noise contours are illustrated on Figure 6-A.

The portion of East Granby exposed to aircraft noise from RW 33 departures is largely vacant with a few residences scattered along Main Street. The plan of development proposes agricultural and wetland preservation for the area east of Main Street and approximately two-thirds of a mile to the west of Main Street. Farther west of Main Street, the plan of development proposes residential use with a strip of open space along the Talcott Ridge. The entire area has potential for residential development but the west side of Main Street has the greater potential.

The portion of East Granby exposed to aircraft noise from RW 24 departures is wholly zoned and partially developed as residential use, and further similar development is inevitable. Several mechanisms are available to minimize the incompatibilities between aircraft noise and future development. The northern area of East Granby exposed to aircraft noise is held in several large parcels, and the acquisition of avigation easements by the State in the near future may prove a good investment. Previous analysis revealed that raw residential land is worth $2,000 per acre, and there are approximately 800 such acres in the area. The land in question is currently active agriculture. Avigation easements for noise on developed residential land in other parts of the country cost approximately ten percent of market value. Such easements in East Granby may be acquired for a lesser percentage on a voluntary basis. Conversations[1] with owners of large parcels in the area reveal a willingness to explore and negotiate such easements.

The town of East Granby can mitigate incompatibilities by amending subdivision and zoning regulations as follows:

[1] TelCon, October 17, 1980, Ralph Viets

SUBDIVISION REGULATIONS

"1.26 Land subject to the following conditions shall not be subdivided for residential purposes unless the conditions stated below are remedied to the satisfaction of the Commission by submitted plans. Said plans must be approved by any State regulatory agencies having jurisdiction.

1. *Land prone to flooding.*

2. *Land unsuitable for sanitary disposal by reason of soils character or inability to contain septic tanks and leaching fields in accordance with the specifications and design standards set forth in the Public Health Code of the State of Connecticut."*

Add:

"3. Land subject to sight and sound disturbances from overflying aircraft in accordance with standards set forth under Sec. 102 of the Aviation Safety and Noise Abatement Act of 1980, Public Law 96-193 (49USC2102)."

"3.10 Pre Application Procedure"

Add:

"3.15 It is advised that the developer contact the Connecticut Department of Transportation, Division of Aeronautics, before preapplication in order to determine the extent, if any, of aircraft noise exposure levels and to be advised of recommended development procedures. A letter from the Division of Aeronautics delineating these levels and recommendations should be presented as part of the preapplication in order to avoid undue difficulties at a later stage. If the developer chooses to defer this procedure, he may submit this data during the preliminary phase of his submittal."

"3.20 Preliminary Plan Procedure"

Add:

"3.27 In order to determine the proper development procedures

and standards for the parcel in question, the developer shall submit at this time, if he has not done so in the preapplication, a letter containing the recommendations of the Connecticut Department of Transportation, Division of Aeronautics, as well as an overlay, if applicable, of aircraft noise exposure levels."

"3.33 General Information Required on Final Subdivision Plan:"

Amend:

"13. In addition to the above, the Commission may require such supplementary information as may be required to further determine the developability of the property such as a plan showing the location of structures, driveways, leaching fields, aircraft noise exposure levels, etc."

ZONING REGULATIONS

Add:

"20.55.00 USES PERMITTED IN AIRPORT ENVIRONS ZONE"

"20.55.01 The Airport Environs Zone is defined as the area exposed to severe aircraft noise as determined by the Connecticut Department of Transportation and as appearing on the zoning map."

"20.55.02 The Airport Environs Zone is intended as an overlay district and permitted uses within the zone are those specified by the underlaying zone."

"20.55.03 Erection of structures: No buildings shall be erected for any permitted or special use unless approved by the Commission following a public hearing. Applications for erection of buildings shall include a report of the comments and recommendations of the Connecticut Department of Transportation regarding protection from aircraft noise."

6.5 DEPARTMENT OF TRANSPORTATION

As owner and operator of Bradley, the Department must provide not only constant encouragement to the neighboring towns but also must take aggressive action regarding off-airport land use controls.

The following actions are recommended for implementation by the Department:

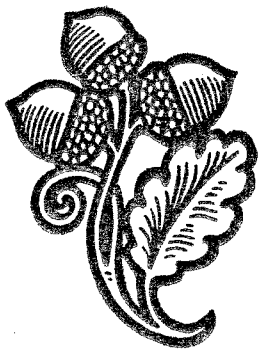
a. When the FAA publishes guidelines relating to Section 107 of the Aviation Safety and Noise Abatement Act, publish Figure 6-C (or an amendment thereof) in all local and Hartford metropolitan newspapers so as to take advantage of the Federal protection.

b. Encourage the towns near Bradley to adopt the recommended amendments to their zoning and subdivision regulations through active solicitations to planning and zoning commissions and to town meetings.

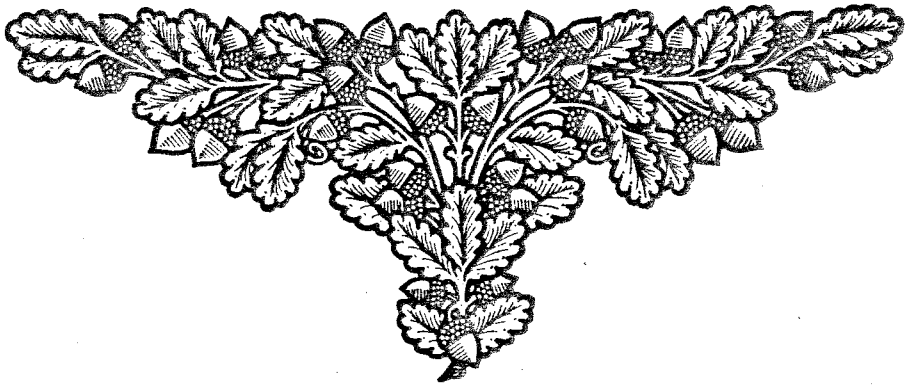
c. Provide recommendations for sound-attenuating construction practices to the neighboring towns by reprinting that information contained in the Appendix to the Bradley Master Plan.

d. Review all agendas of the planning and zoning commissions of the neighboring towns for items related to residential development near the airport. In this manner, the Department will be informed of such development long before construction and will have the opportunity to encourage the towns to take appropriate mitigation measures.

e. Actively pursue acquiring avigation easements from owners of large vacant parcels by stressing the advantages of the removal of a hindrance to development.



13. PLANNING REVIEW



A. BRIEF ANALYSIS OF FEASIBILITY:

"The Ridge" subdivision plan proposes to place 518 new homes on about 820 acres in East Granby, utilizing MDC sewerage and community wells. As such, it is a very large development proposal which if approved, would have a major impact on the Town of East Granby in terms of land use, traffic, schools, and requirements for other services. In assessing the feasibility of such a development proposal, at least the three (3) following criteria should be considered:

(1) physical base

(2) availability of water and sewer services

(3) environmental health factors

1A. Physical Base

Regarding physical base, it is clear that the property in question has many site limitations. First of all, the western fringe of the area along the ridgetop is indicated as having a 15-35% slope with rock outcrops occupying over 50% of the surface. Furthermore, most of the remainder of the western half of the property is over 15% in slope and often stony to very stony in character. Finally, poorly and very poorly drained soils occupy a substantial share of the property, especially in the broad swale separating the ridge from the higher land to the east along Main Street. In addition, the development as proposed would seriously impact and alter this wetland area. (see Geology and Soils sections for further information.)

2A. Availability of Water and Sewer Services

Secondly, the availability of water and sewer service or lack thereof will define the density of development which is feasible. This property presently has no municipal water or sewer service and there are no plans to provide either to this portion of the Town. In addition, even should a hookup to the MDC line which will serve the Town center be proposed, Town spokesmen have said there will be no available capacity to handle sewerage from this development. Also, in view of the subsurface geology, it is questionable whether a bedrock well would produce the volume of water needed for a community system to serve a development of this size. (see Geologic Development Concerns and Water Supply for further information.)

3A. Environmental Health Factors

Thirdly, consideration should be given to environmental health factors, specifically noise pollution in this case. The area in question reportedly lies in the path of one of the main runways of Bradley Field, a major and growing regional airport. Thus homes in this area and particularly on the ridge will be exposed to a high level of noise. (see Noise Impacts for further information.)

4A. Other Factors

In addition to the three (3) limiting criteria discussed above, it is also desirable to consider the impact of development on significant natural, cultural, historical and recreational features. In this case, the proposed development would impact on a large segment of Metacomet Ridge/Talcott Mountain, the dominant physical landmark in Central and North Central Connecticut. Furthermore, the crest of this ridge is followed by the Metacomet hiking trail, a major recreational asset extending from Meriden to Mount Monadnock in New Hampshire. Unless properly designed, any development on the ridge would either impact the trail directly or do so indirectly through impacting the trail corridor.

5A. Summary of Feasibility of Development In it's Present Form

In summing-up the results of the above analysis, it is clear that "The Ridge" development in its present form is both unfeasible and undesirable, for at least the following reasons:

(1) Use of steep and/or shallow to bedrock soils and likely erosion problems.

(2) Development of steep streets posing traffic safety, emergency service, and road salt pollution problems.

(3) Use and alteration of a major wetland area.

(4) Probable physical and chemical impact on a major wetland area through siltation and runoff of road salt and possible impact of salt on local groundwater.

(5) Lack of municipal sewer service.

(6) Lack of municipal water service and questionable feasibility of developing a community well capable of servicing the entire development.

(7) Lack of conformance with the Town Plan of Development.

(8) Serious noise pollution impact.

(9) Impact on Metacomet Ridge as a key natural feature.

(10) Likely impact on the Metacomet hiking trail.

B. PLANNING REVIEW RELATED TO DESIGN ASPECTS:

The site offers a unique opportunity for planned residential development due to its extreme topographic relief and its combination of open meadows and a wooded ridge. The land proposed for development is located within a portion of East Granby zoned Planned Residential Development (PRD). As stated in the East Granby Planning and Zoning Regulations:

"The purpose of these regulations concerning Planned Residential Development is to encourage variety and flexibility in residential land development, conservation of open spaces and scenic and natural resources, imaginative site planning and architectural design and prevention or curtailment of urban sprawl."

It is the Team Planner's opinion that the design of "The Ridge" fails to meet the intent of the PRD Zone. There are many functional and aesthetic problems associated with the proposed design for the project. Not only is the intent of the PRD Zone disregarded; the design fails to satisfy many of the actual requirements of the regulations. The remainder of this section of the report will involve identification of some of the major problems pertaining to the design as well as some suggestions as to what might be a more appropriate type of development for the site.

1B. Density

The most significant problem associated with the design of "The Ridge" is that the density proposed is far to great for the site. Under the East Granby PRD regulation:

"The maximum density shall be no more than two (2) dwelling units per three (3) buildable acres where on-site water and sewerage are provided. The density may be further restricted in areas where satisfactory drainage and sanitation systems cannot be provided."

"If community water supply is available the maximum density may be reduced to two (2) dwelling units per two (2) buildable acres."

"Buildable Land - In general, wetlands, ponds, streams, floodplains, swamps and land where the average grade is in excess of 15 percent, or where bedrock or high groundwater levels are present shall be defined as unbuildable. The final classification shall be determined by the Commission."

The site plans which have been submitted illustrate no effort to delineate buildable land. Clearly there are a great deal of wetlands and many areas with slopes in excess of 15 percent, yet the plan proposes fairly uniform sized lots regardless of the steepness of terrain or presence of other building constraints. (Preliminary Site Plan dated 8/6/86.)

It is important to note that the development as proposed relies on a community water system and sewer service tied into the MDC System. The Team Planner believes that the developer is being very optimistic in thinking that a community water system, yet to be developed, can adequately meet the needs of 518 single-family homes and a nine (9) hole golf course.

A significant issue regarding the density of this project is the availability of sewer service. Currently service to the site is not available and the Town of East Granby has no agreement with the Metropolitan District Commission to extend existing lines. If it can be confirmed that sewer service will not be extended to the site at this time, the Team Planner believes that the East Granby Planning and Zoning Commission would be justified in denying the application on the criteria of excessive density.

Based on an analysis of the U.S.G.S. topographic map which includes the site, it is safe to assume that at least fifty percent (50%) of the should be identified as "unbuildable". At a density of two (2) dwelling units per acre (assuming 400 buildable acres) the site could only accommodate 400 units. Considering the percentage of wetlands and steep slopes present as well as the lack of sewer service, the stricter standard of two (2) dwelling units per three (3) buildable acres would represent a more reasonable holding capacity for the site. At that density based on 400 buildable acres, the site could accommodate approximately 266 units. It is the Planner's opinion, that this figure of 266 units would represent a maximum number of units suitable for the site. This figure is an assumption based on a general look at site conditions, more detailed mapping of wetlands and steep slopes at the scale of the subdivision plan would clarify this issue of approximate density.

2B. Lot Layout

Another major problem associated with "The Ridge" proposal is the pattern of subdivision (lot layout) which has been utilized. The pattern of development proposed is not at all unique, with uniform sized lots somewhat larger on the steeper portions of the site and smaller in the flatter areas. The site plan illustrates no effort to incorporate imaginative planning techniques or to avoid the effect of urban sprawl. Simply put, the intent of the PRD regulation is not met by the proposed plan.

The site's most unique feature, the ridge ascending to the summit of Peak Mountain has been divided into lots as if it were sitting in a flat pasture. Many of the proposed lots are situated on terrain far to steep to safely accommodate driveways. No recognizable effort has been made to relate lot boundaries and orientation to optimal siting locations for homes. "The Ridge" proposal more clearly resembles a tract development of the 1950's than does it typify innovative contemporary developments occurring elsewhere in the Capitol Region.

Particularly troublesome is the use of rear lots in circumstances where frontage on a subdivision street is not practical. Several of the proposed rear lots on the ridge would require extremely steep lengthy driveways which could present a significant problem for emergency access (fire trucks, utility repair, etc.) as well as being inconvenient for homeowners.

The layout of uniformly sized subdivision lots on the steeper slopes denies the opportunity of clustering structures on plateau areas. Clustering of homes on natural plateau areas located at varying intervals along the ridge would accommodate easier access and reduce susceptibility to erosion and sedimentation problems. By avoiding the use of cluster design, the site plan necessitates clearing more forested area than is advisable and magnifies the visual impact of development along higher portions of the ridge.

Many problems associated with lot layout on the steep portions of the site have been mentioned, however, the lot arrangement proposed for the lower, flatter part of the site has its drawbacks as well. It is obvious that the small lot subdivision configuration proposed for this part of the site requires an excessive amount of streets, cul-de-sacs, private drives and driveways. The amount of impervious surface which would be required by this design is significant. The stormwater retention capacity proposed for the project seems inadequate. Again, a clustering of homes would allow for common drives with some shared parking, resulting in a substantial net reduction in impervious surface.

3B. Access

As mentioned in conjunction with comments on lot layout, there are several problems regarding access within the site that can be readily observed by review of the site plan. Excessive cut and fill would be required in some places where proposed subdivision streets negotiate the steepest portion of the ridge. Also the grade (% slope) required for portions of some of the streets exceeds ten percent (10%) which could present safety problems in wet conditions or during the winter. The steep grades would complicate snow removal procedures and require the use of a considerable amount of road salt and sand. Groundwater contamination by road salt and sedimentation of retention ponds with sand could result from development of site access roads as proposed. The steep driveways which would be necessary for many of the proposed lots would further magnify these problems.

There could be several potential problems related to the streets proposed to run the full width of the site on the higher portions of the ridge. The visual impact of the development as viewed from below would be maximized. The extensive clearing of vegetation and construction of homes at the same elevation on the ridge would detract from the picturesque beauty of Peak Mountain as it currently exists and could maximize erosion and sedimentation concerns. The lengthy roads crossing the ridge also reduces the opportunity for varying lot orientation to accommodate optimal siting locations for homes. These roads may also promote higher vehicular speeds than desirable.

It is the Planner's opinion that standard subdivision development of a project of this magnitude requires an excessive amount of streets and drives. The long-term maintenance costs for the access roads of this project could put a major burden on the Town of East Granby for the public streets and on the homeowner's association for the private drives.

4B. Conservation and Open Space

The proposed site plan for "The Ridge" fails to meet the intent of the PRD regulation in respect to its treatment of open space. The regulation suggests that open space be integrated throughout the project and that unique natural features of the terrain be retained, when reasonably possible. This practice has not been followed with the current plan. Open space has been concentrated in the low lying portion of the site, much of which is recognized as "inland wetlands".

Several planning documents recommend that the higher, steeper portions of the Peak Mountain ridge be conserved as open space. Among these documents are the East Granby Plan of Development (1976), the Capitol Region Plan of Development (1978), and the State Policies Plan for the Conservation and Development of Connecticut (1982-1985). Although the regional and State plans are advisory, the fact that they recognize Peak Mountain as a natural resource of regional or State significance should warrant consideration by East Granby Planning Officials. The East Granby Plan recommends that development be avoided on slopes in excess of fifteen percent (15%), which excludes a great deal of the ridge. The Town plan of development sets the overall policy framework for the East Granby Zoning Regulations which recognize much of the ridge as "unbuildable" land. It would seem logical for the Planning and Zoning Commission to promote a pattern of development which would provide for more open space on the ridge to reduce the aesthetic impact and environmental impact upon one (1) of the most picturesque areas in East Granby.

A great deal of the open space that is provided in the proposed plan comes in the form of a golf course. Portions of the proposed course would encroach upon wetlands, requiring major re-grading and alteration of surface drainage patterns. Given the increased runoff which would be caused by upslope development it would seem sensible to maintain as much stormwater retention capacity as possible. A golf course may or may not be appropriate for the site pending on the design of the course. More detailed plans of the proposed course would be required to make that assessment. However, the heavy fertilizer and pesticide/herbicide use that would result from such a development should be considered in respect to its impact on ground and surface waters.

5B. Course of Action

The problems associated with "The Ridge" development as it has been proposed are many, from a planning perspective just a few have been cited. This is not to say that the site would not lend itself to a very satisfactory planned residential development. It is obvious that the developer has submitted this proposal in order to see just what the Town of East Granby would or would not allow. The plan suggests a density and style of development unsuitable for the site. At this point, the most appropriate course of action for the East Granby Planning and Zoning Commission would be to provide the developer with some general input on what type of development and density would be acceptable under local regulations. It is suggested that the Commission inform

the developer that much more information regarding the physical conditions of the site and details of the proposed design are needed to adequately judge the merits of even a "preliminary application" for a development of this magnitude.