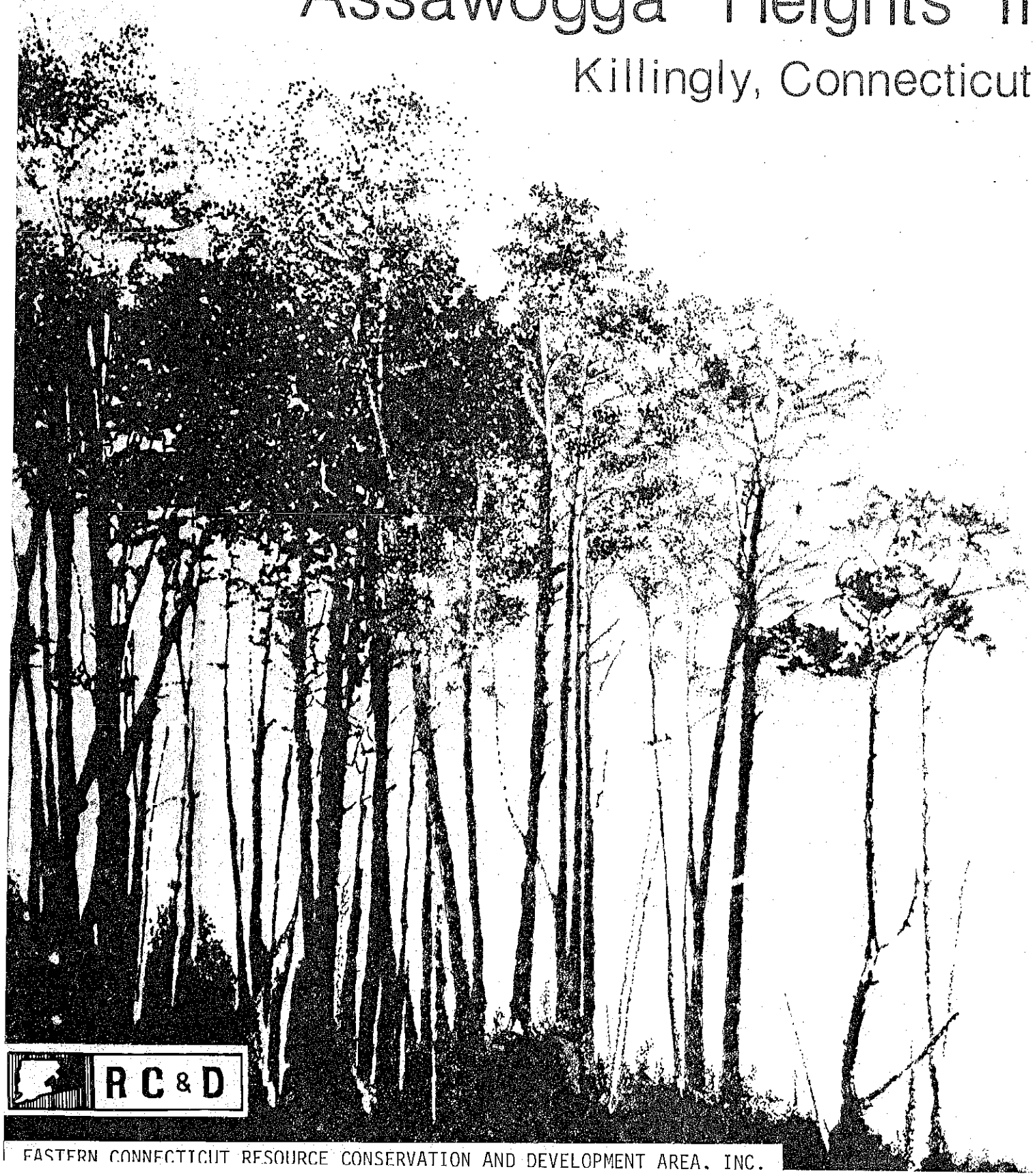
Environmental Review Team Report

Assawogga Heights II

Killingly, Connecticut



R C & D

EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

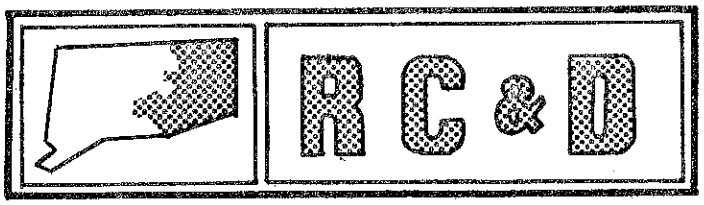
Environmental Review Team Report

on

Assawogga Heights II

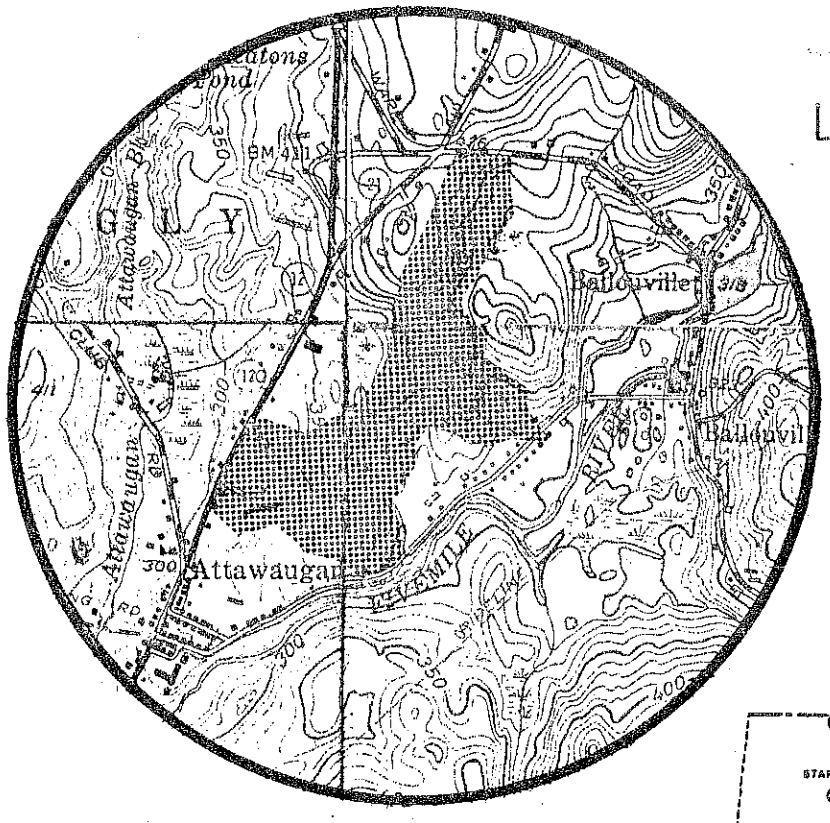
Killingly, Connecticut

March 1979



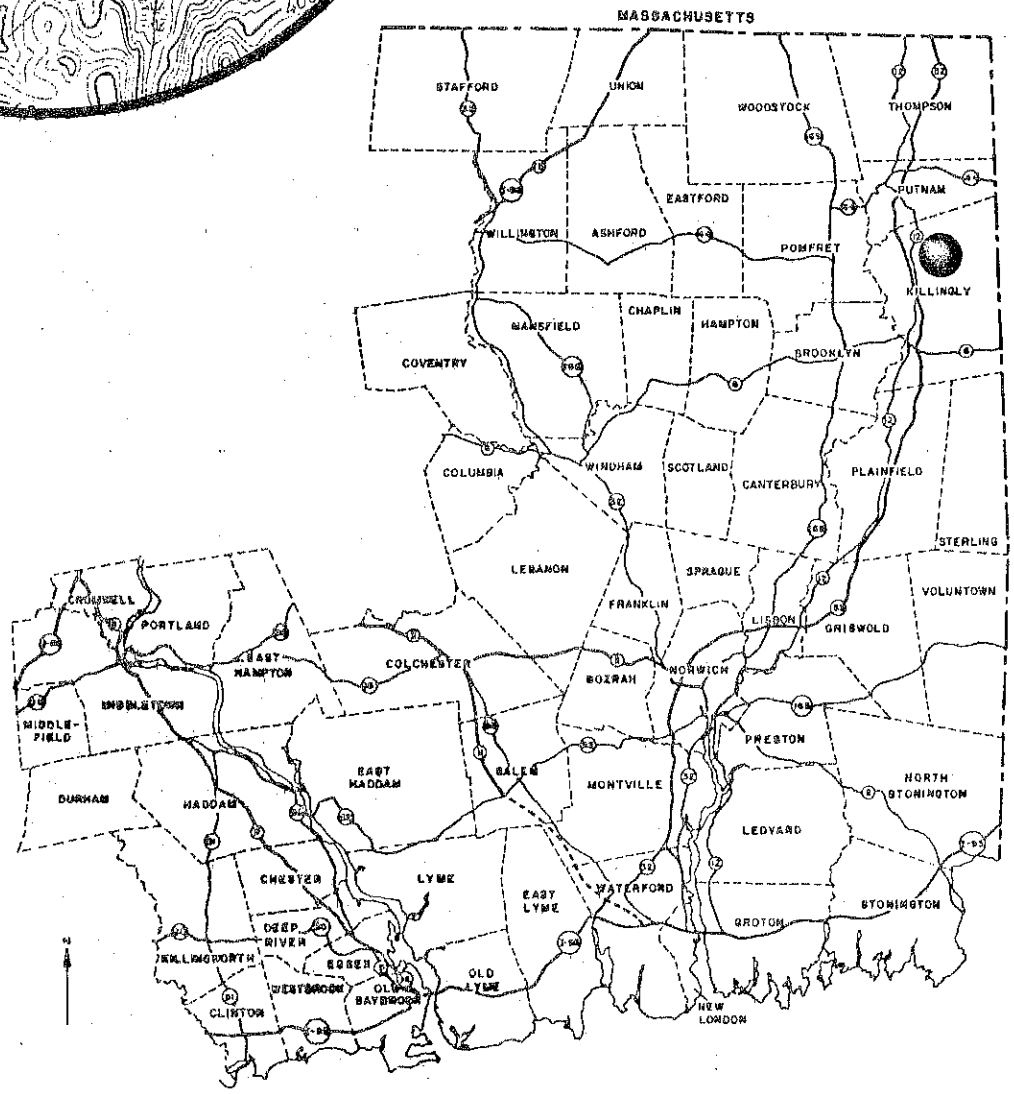
eastern connecticut resource conservation & development area

environmental review team
139 boswell avenue
norwich, connecticut 06360



Location of Study Site

ASSAWOGGA HEIGHTS, SECTION II
KILLINGLY, CONNECTICUT



EASTERN CONNECTICUT
RESOURCE CONSERVATION AND DEVELOPMENT PROJECT

ENVIRONMENTAL REVIEW TEAM REPORT
ON
ASSAWOGGA HEIGHTS, SECTION II
KILLINGLY, CONNECTICUT

This report is an outgrowth of a request from the Killingly Planning and Zoning Commission, to the Windham 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 as a project measure. The request was approved and the measure reviewed by the Eastern Connecticut Environmental Review Team (ERT).

The soils of the site were mapped by a soil scientist of the United States Department of Agriculture (USDA), Soil Conservation Service (SCS). Reproductions of the soil survey map as well as a topographic map of the site were distributed to all ERT participants prior to their field review of the site.

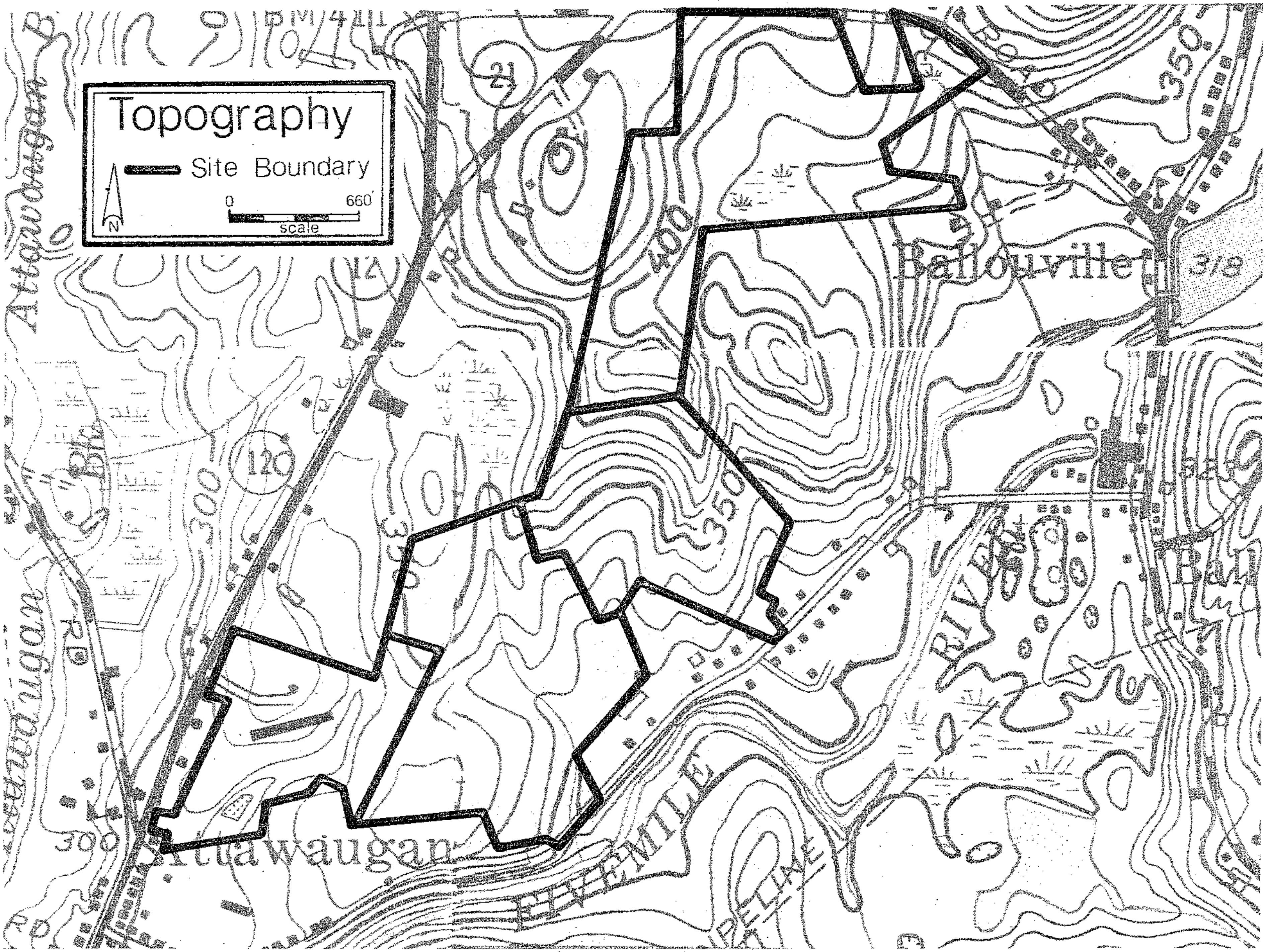
The ERT that field checked the site consisted of the following personnel: Howard Denslow, District Conservationist, Soil Conservation Service, (SCS); Ed Lukacovic, Soil Conservationist, (SCS); Michael Zizka, Geologist, Department of Environmental Protection (DEP); Rob Rocks, Forester (DEP); Ernest Julian, Sanitarian, State Department of Health; Peter Demallie, Regional Planner, Northeast Regional Planning Agency, (NECRPA); Terence Chambers, Regional Highway Safety Engineer, (NECRPA); and Jeanne Shelburn, ERT Coordinator, Eastern Connecticut RC&D Area.

The Team met and field-checked the site on Thursday, December 28, 1978. Reports from each Team member were sent to the ERT Coordinator for review and summarization for the final report.

This report is not meant to compete with private consultants by supplying site designs or detailed solutions to development problems. This report identifies the existing resource base and evaluates its significance to the proposed development and also suggests considerations that should be of concern to the developer and the Town of Killingly. The results of this Team action are oriented toward the development of a better environmental quality and the long-term economics of the land use.

The Eastern Connecticut RC&D Project Committee hopes you will find this report of value and assistance in making your decisions on this particular site.

If you require any additional information, please contact: Ms. Jeanne Shelburn, Environmental Review Team Coordinator, Eastern Connecticut RC&D Area, 139 Boswell Avenue, Norwich, Connecticut 06360, 889-2324.



Topography
Site Boundary
0
660'
scale
N
Ballouville
Attawaugan
FIVEMILE
RIVER
ROAD
400
350
300

INTRODUCTION

The Eastern Connecticut Environmental Review Team was asked to prepare an environmental assessment for a development proposal in Killingly, known as Assawogga Heights, Section II. The Team reviewed the first section of Assawogga Heights, now under construction, during the Spring of 1978. The proposed project includes residential and commercial land uses; the site is presently owned by Clover Development, Inc.

The site is composed of three contiguous parcels: Parcel A, approximately 17 acres along the eastern side of Route 12, north of the Attawaugan village center and the junction with Country Club Road; Parcel B, approximately 36 acres along the northern side of Attawaugan - Ballouville Road, west of and contiguous to the initial 29 lot Assawogga Heights, now under construction; and Parcel C, approximately 45 acres along the southern side of Ware Road.

In Parcel A, the developers intend to remodel an existing chicken coop in order to convert its use to retail commercial. A new road, most likely to be located on the northerly side of the coop, would bisect the 17 acres and direct traffic flow between Route 12 and Parcel 'B,' as well as serve development of parcel 'A.' Two 50-unit elderly apartment projects are proposed for the north and south sides of the coop, each on a minimum of 5 acres.

Parcel B will be a continuation of the first phase of Assawogga Heights by expanding single family residential construction into the adjoining parcel. This would entail the construction of forty to fifty new single family homes and new streets and related drainage facilities. These new streets would not only complete a loop to Attawaugan - Ballouville Road, but will also connect with the new road from parcel 'A.'

Construction of a large 180 unit multi-family residential development, tentatively proposed to include recreational facilities (tennis courts) and twenty acres of open space, is planned for Parcel C. All units will be serviced by on-site wells and the municipal sewerage system.

The Team finds that this proposal conforms to some elements of the local Plan of Development, but not all. Specifically, parcels 'A' and 'C' appear to conform only to general housing and commercial goals, but not to location. Parcel 'B' conforms to location and general goals. The large open space tract conforms to the town plan as to location, but may not meet the active recreation objective due to physical limitations. There is general conformity to the housing and commercial goals of the Regional Plan of development.

In order to evaluate this proposal relative to pedestrian and vehicular safety, stormwater runoff, erosion control, and the overall adequacy of facilities, the Team would need construction plans for:

1. existing and proposed storm drainage facilities including detention facilities where required;
2. supportive calculations for above;
3. vertical/horizontal alignments of roads;
4. supportive mapping to determine sight line distances at intersections;

5. parcel 'C's' pond grading plan;
6. proof that downstream structures have sufficient capacity to handle increased flows where detention facilities are not planned;
7. erosion control measures.

Preliminary review of sketch plans indicates horizontal line-of-sight problems might arise at the Attawaugan - Ballouville Road junction with the new road for parcel 'B' as well as parcel 'C's' new egress onto Ware Road.

Other Team concerns included the question of water-supply adequacy on this site for the density of development planned and the possibility of contamination of this water supply by chicken manure leaching into the soil.

ENVIRONMENTAL ASSESSMENT

GEOLOGY

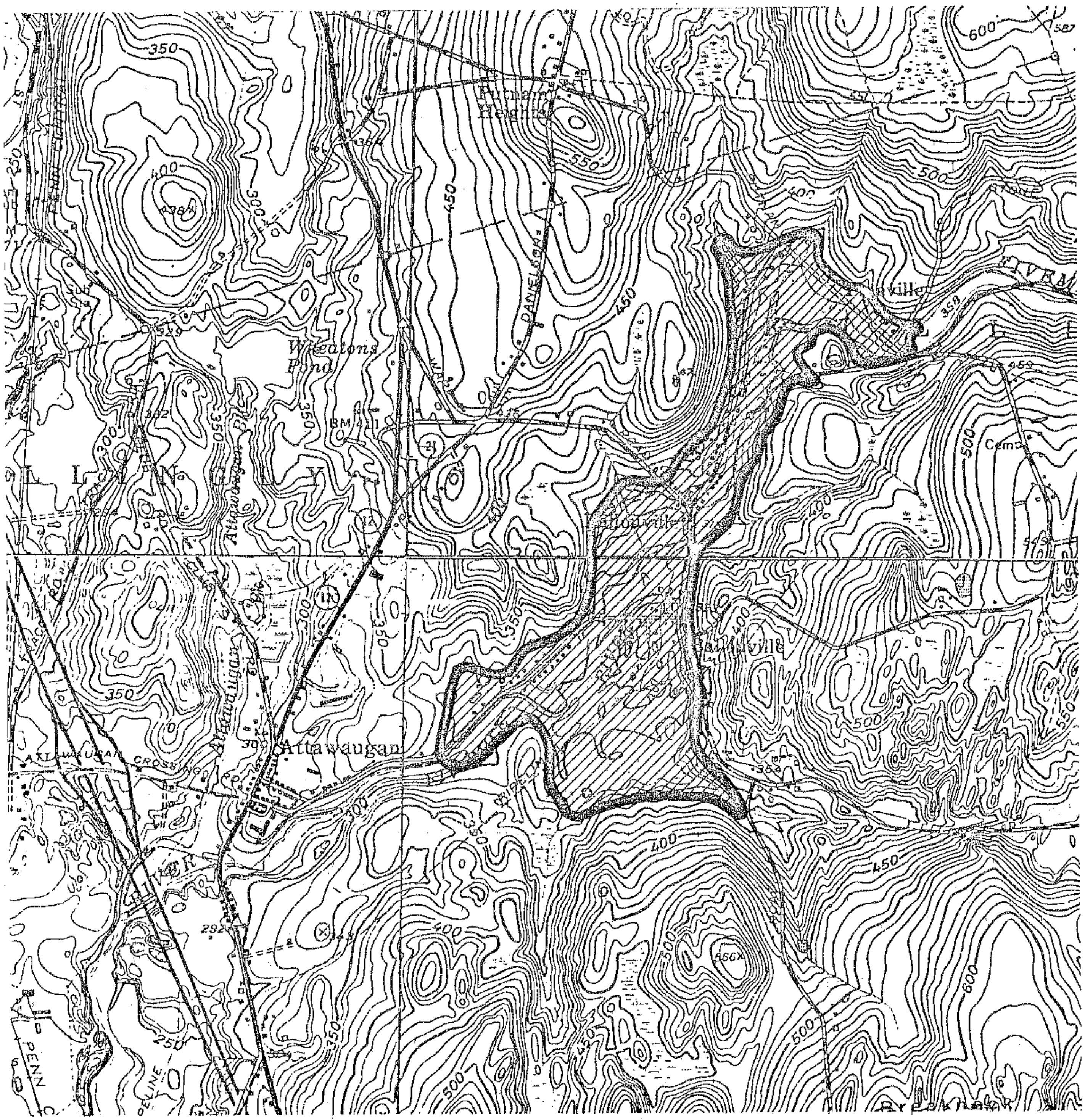
Almost all of the surficial geologic material on the property is till, a glacial deposit composed of clay, silt, sand, gravel, and boulders in various proportions. As glacier ice moved through the area more than 1,500 years ago, it collected and transported particles from preexisting soils and weathered bedrock, and plucked and abraded exposed bedrock surfaces. Small meltwater streams and pools on, under, and within the ice served as collection areas for coarse particles (largely sand and gravel), which are found in pockets scattered throughout the till. The general texture of the upper part of the till appears to be sandy, stony, and relatively loose. Underlying layers may be siltier and very compact. The thickness of the till probably averages 10-15 feet in the areas of the property proposed for development. In the suggested open-space corridor, the till thickness probably averages 5-10 feet.

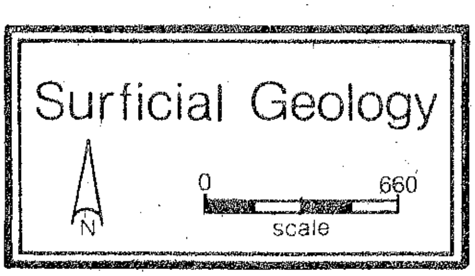
In the area of the property bordering Attawaugan - Ballouville Road, extensive sand and gravel deposits may be found. Known as stratified drift, these deposits were laid down by meltwater streams emerging from the wasting glacier ice. Stratified drift often has high potential for water supplies. Further discussion of this issue may be found in the Water Supply section of this report.

A gray to pink granitic gneiss is the principal type of bedrock underlying and cropping out on the site. Gneiss is a typically medium- to coarse-grained rock type in which elongate or platy minerals alternate in irregular, thin bands with more rounded mineral grains. The gneiss on the property is composed largely of the minerals quartz, microcline, oligoclase, and biotite.

HYDROLOGY

All runoff from the property flows into Five Mile River. Development may be expected to cause significant increases in the volume of runoff shed from the property and in the peak flows of the small feeder streams to Five Mile River. Because of its extensive drainage area (approximately 50 square miles), Five Mile River itself should show few noticeable effects from the development in terms of increased flows.





Distribution of stratified drift in the vicinity of Assawogga Heights. (Adapted from Connecticut Water Resources Bulletin No. 8, Plate B.)

Although details of the development proposal were somewhat imprecise at the time of the Team's field review, it was possible to generate an estimate of run-off volume and peak-flow increases for the stream that passes through the proposed single-family area. The method used in the estimation may be found in Technical Release No.55 of the Soil Conservation Service. It was assumed, for the purposes of the calculations, that about 40 percent of the hydraulic length of the small drainage area associated with the stream would be modified by the development. The results are given in an accompanying table.

While the figures shown in the table represent, at best, a ballpark level of accuracy, due to the lack of detailed information, they do indicate the need for careful engineering studies to be made of the proposed development and its effects on present or planned drainage structures. Such studies should account for all parts of the development, since runoff increases are likely to be significant in each area (although not necessarily similar to the increases expected in the single-family section).

Other hydrologic considerations are contained in the Soils section of this report.

Runoff volumes and peak flows from the single-family residential section.

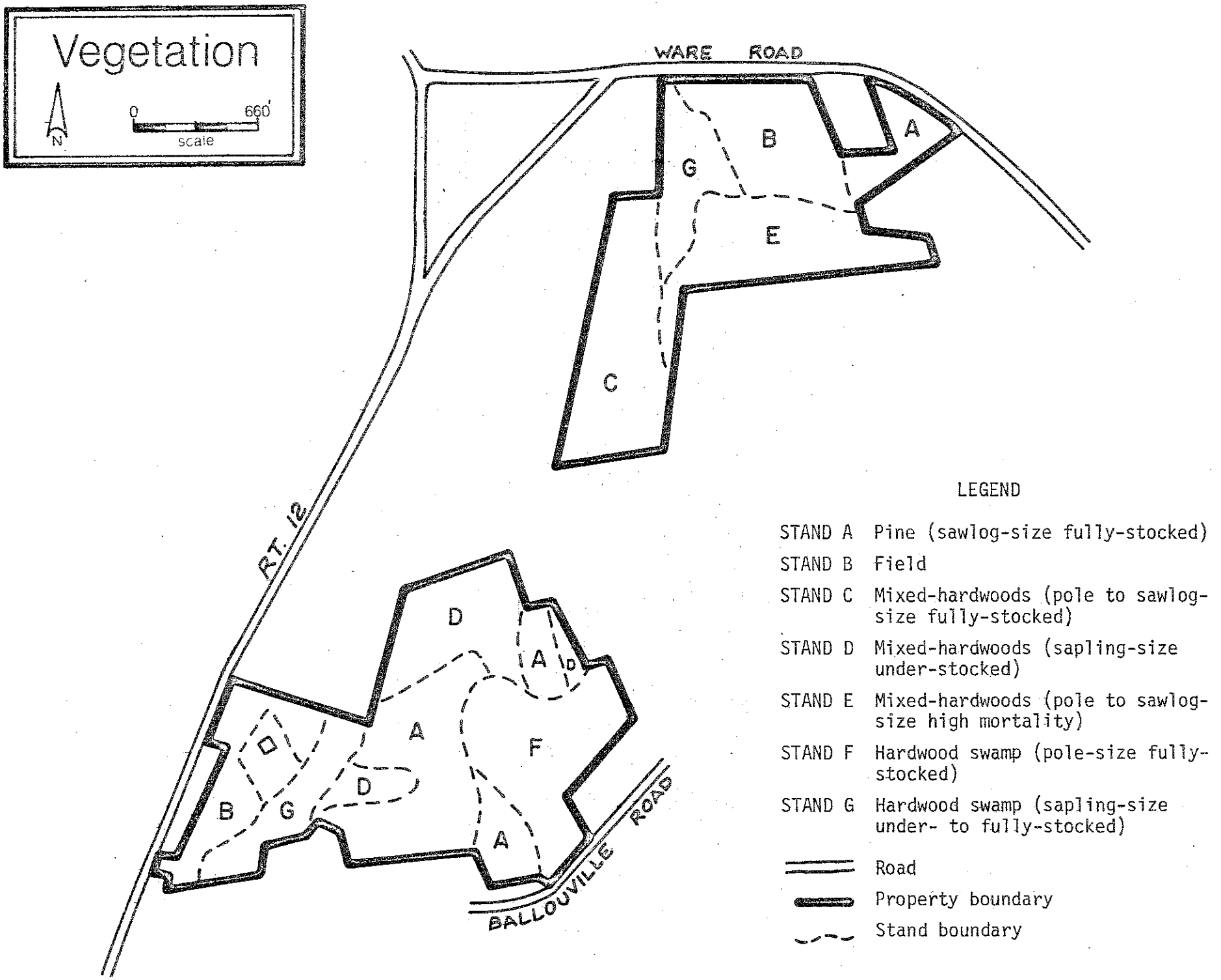
Runoff Volumes	Present Conditions	Full Development	% Increase
25-year storm	11.8 acre-feet	15.6 acre-feet	31
50-year storm	15.1 acre-feet	19.2 acre-feet	27
Peak Flows			
25-year storm	64 cubic feet/second	161 cubic feet-sec.	151
50-year storm	88 cubic feet/second	207 cubic feet/sec.	135

VEGETATION

Assawogga Heights, Section II can be divided into seven major vegetation types. (See Vegetation Map). Poorly drained soils in some areas and rapidly permeable soils with low water tables in other areas limit forest vegetation growth. Trees disturbed by development and those already in danger of falling may become hazardous to people and property. Thinnings in several of the stands for fuel wood would increase the aesthetics of the area and improve the stability of the remaining forest.

Stand A: Medium quality site. Sawlog size white pine (greater than 11 inches in diameter at breast height - DBH). White pine fully occupy this 12 acre stand. Black cherry seedlings are present. Club mosses and ferns comprise the sparse ground cover.

Stand B: Open field. The three open fields, totalling 16 acres are primarily vegetated by a thick mat of grasses in combination with milkweed, goldenrod, black-eyed susans, sweet fern, black raspberry, smooth sumac and multi-flora rose. One of these fields also contains white pine and red cedar saplings (1 to 5 inches DBH) and choke cherry seedlings (less than 1 inch DBH).


Vegetation
N
0
660'
scale
WARE ROAD
RT. 12
BALLOUVILLE ROAD
A
B
C
D
E
F
G
LEGEND
STAND A Pine (sawlog-size fully-stocked)
STAND B Field
STAND C Mixed-hardwoods (pole to sawlog-size fully-stocked)
STAND D Mixed-hardwoods (sapling-size under-stocked)
STAND E Mixed-hardwoods (pole to sawlog-size high mortality)
STAND F Hardwood swamp (pole-size fully-stocked)
STAND G Hardwood swamp (sapling-size under- to fully-stocked)
Road
Property boundary
Stand boundary

Stand C: Mixed hardwoods. Fourteen acres of pole size (5 to 11 inch DBH) and sawlog size white oak, scarlet oak and black oak make up this fully stocked stand. Oak mortality is high in this stand and many of the living trees are declining in health. The understory here consists of sapling-size white pine. Huckleberry, greenbriers, ferns and club mosses make up the ground cover.

Stand D: Mixed hardwoods. Poor quality sapling size white oak, scarlet oak, red maple, white pine and big tooth aspen dominate this 12 acre under-stocked stand. The understory is made up of high bush blueberry and hardwood tree seedlings. Club mosses and grasses form the ground cover.

Stand E: Mixed hardwoods. Pole to sawlog-size red oak, white oak, hickory and white ash make up this fully stocked 17 acre stand. Seedling to sapling size white pine, red maple, black birch and oak made up the understory. Ground cover is primarily moss, ferns and club moss.

Stand F: Hardwood swamp. This 13 acre fully-stocked stand is made up of poor quality, pole-sized red maple with scattered pole to sawlog-size white pine intermixed. Highbush blueberry and maple leaf viburnum dominate the understory. Ground cover consists of club mosses and ferns.

Stand G: Hardwood swamp. Sapling-size red maple in clumps occupy this 11 acre wetland with occasional yellow birch. This stand is fully-stocked on the moderately wet areas and under-stocked on the wettest areas. The understory species are sweet pepperbush, high bush blueberry and witch hazel. Marsh grasses, ferns and club mosses predominate in the ground cover.

The high water table and poor soil aeration conditions which occur in Stands F and G limit vegetation growth to species undesirable for forest management. The trees which occupy wetland sites are usually shallow rooted and frequently have stunted growth rates.

These wetlands are fragile eco-systems, permanent changes in ground water levels may kill vegetation growing there. If fills must be made to create access to the higher land areas, ground water levels should be altered as little as possible. Shallow root systems and saturated soils are the principle reasons why many trees in wetland areas are not very windfirm. Openings should not be made which would allow the wind to flow through, rather than over the stand, because the chance of windthrow would be greatly increased.

The droughty soils in the location of Stand D limit growth rates of the hardwood species present. Moisture moves through this soil type rapidly until it reaches the water table, which may be below 60 inches for the greater part of the year. The trees present are unable to get the amounts of water they require during the rapid growth season.

Dead trees or shallow rooted trees which are in danger of falling may be potential hazards if located near utility lines, roadways, buildings or recreation areas. These trees should be removed during the construction process.

Efforts should be made to avoid damaging trees during development. Trees have sensitive root systems which generally spread as wide as the tree's crown. Alteration of the soil under the canopy of a tree may injure roots which could cause the tree to die within three to five years of the original injury. If trees are badly damaged

their removal would be most economical at the time of injury.

The white pine in Stand A appear overcrowded from an aesthetic viewpoint. Thinning the stand to approximately 100 high quality trees per acre would not only improve the visual quality of the area, but also provide additional space, sunlight, and nutrients for the residual trees.

SOILS

A detailed soils map of this site is included in the Appendix to this report, accompanied by a chart which indicates soil limitations for various urban uses. As the soil map is an enlargement from the original 1,320'/inch scale to 660'/inch, the soil boundary lines should not be viewed as absolute boundaries, but as guidelines to the distribution of soil types on the site. The soil limitation chart indicates the probable limitations for each of the soils for on-site sewage disposal, buildings with basements, buildings without basements, streets and parking, and landscaping. However, limitations, even though severe, do not preclude the use of the land for development. If economics permit large expenditures for land development and the intended objective is consistent with the objectives of local and regional development, many soils and sites with difficult problems can be used. The soils map, with the publication Soil Interpretations: Windham County, Connecticut, can aid in the identification and interpretation of soils and their uses on this site. Know Your Land: Natural Soil Groups for Connecticut can also give insight to the development potentials of the soils and their relationship to the surficial geology of the site.

Soils typical of the Assawogga Heights, Section II site include the Canton and Charlton series, the Gloucester series, the Charlton-Hollis series, the Hollis series, the Woodbridge series, the Sutton series, the Merrimac series and the Ridgebury Leicester and Whitman series, a regulated wetland under Public Act 155. These soils limit development due to their seasonally high water tables, slope, and stoniness.

3XB Canton & Charlton very stony fine sandy loams, 3 to 8% slopes.
32XB Canton & Charlton very stony fine sandy loams, 3 to 8% slopes.
85XB Canton & Charlton very stony fine sandy loams, 3 to 8% slopes. Canton and Charlton are well-drained soils developed in upland till normally deeper than 5 feet. These soils are rapidly permeable in the subsoil, but slowly to very slowly permeable layers may be present below 60 inches. The water table normally is below 60 inches during most of the year. The Canton and Charlton soils are naturally stony and contain few to many stones throughout the soil. Gravel size rock fragments generally make up to 10 to 30 percent of the surface and subsoil. Most use problems are related to slope and stoniness. Stones cover as much as 3 percent of the surface area.

3MC Canton & Charlton extremely stony fine sandy loams, 3 to 15% slopes.
32MC Canton & Charlton extremely stony fine sandy loams, 3 to 15% slopes.
85MC Canton & Charlton extremely stony fine sandy loams, 3 to 15% slopes. This gently sloping to sloping unit consists of two soils, Canton and Charlton, which occur in patterns too intricate to separate in mapping. About 50 percent of the unit is similar to the soil described for the Canton series. Canton are well-drained soils developed in upland till normally deeper than 5 feet. These soils are rapidly permeable in the subsoil, but slowly to very slowly permeable layers may be present below 60 inches. The water table normally is below 60 inches during most of the year. The Canton soils are naturally stony and contain few to many stones throughout the

soil. Gravel size rock fragments generally make up 10 to 30 percent of the surface and subsoil. Most use problems are related to slope and stoniness. More than 3 percent of the surface is covered with stones.

85B Canton and Charlton fine sandy loams, 3 to 8% slopes. Canton and Charlton are well-drained soils, that developed in upland till normally deeper than 5 feet. These soils are rapidly permeable in the subsoil, but slowly to very slowly permeable layers may be present below 60 inches. The water table normally is below 60 inches during most of the year. The Canton and Charlton soils are naturally stony and contain few to many stones throughout the soil. Gravel-size rock fragments generally make up 10 to 30 percent of the surface and subsoil. Most use problems are related to slope and stoniness.

11MD Gloucester extremely stony sandy loam, 15 to 35% slopes. Gloucester are somewhat excessively drained soils developed in upland till mainly from granite bedrock. These soils are normally deeper than 5 feet. They are rapidly permeable. Below 60 inches, slowly permeable layers may be present. The water table normally is below 60 inches during most of the year. The Gloucester soils are naturally stony and contain few to many stones throughout the soil. Gravel size rock fragments generally make up 10 to 30 percent of the surface and subsoil. Most use problems are related to slope and stoniness. This moderately steep and steep areas occur in patterns too intricate to separate in mapping. Some of the surface is lost through erosion. More than 3 percent of the surface is covered with stones.

17LC Charlton-Hollis fine sandy loams, very rocky, 3 to 15% slopes. This gently sloping to sloping unit consists of two soils, Charlton and Hollis, which occur in patterns too intricate to separate in mapping. About 50 percent of the unit is similar to the soil described for the Charlton series. Charlton are well-drained soils developed in upland till normally deeper than 5 feet. These soils are moderately permeable in the subsoil, but slowly to very slowly permeable layers may be present below 60 inches. The water table normally is below 60 inches most of the year. The Charlton soils are naturally stony and contain few to many stones throughout the soil. Most use problems are related to slopes and stoniness. Hollis soils make up about 30 percent of this mapping unit and occur when bedrock is less than 20 inches deep. This mapping unit has rock outcrop covering 10-25 percent of the surface and few to many stones on the surface.

17MC Hollis-Rock outcrop complex, 3 to 15% slopes. Hollis are somewhat excessively drained soils developed in sandy material over bedrock, from a few to 20 inches deep, of principally schist and gneiss. They occur on uplands where surface rock outcrops vary from few to numerous and varying amounts of surface stone are present. These soils have rapid permeability. Most use problems are related to the depth of bedrock, droughtiness, slope, and rock outcrop. The slopes occur in patterns too intricate to separate in mapping. Rock outcrops cover from 20 to 50 percent of the surface area.

31B Woodbridge fine sandy loam, 3 to 8% slopes. Woodbridge are moderately well drained soils developed in fine sandy loam mantles, about 24 inches deep, over a hardpan. The hardpan normally extends below 60 inches. These soils, normally deeper than 10 feet, occur on rolling uplands. The slowly to very slowly permeable hardpan restricts internal drainage. The water table normally rises to within 20 inches of the surface during the winter and spring months. A perched water table may occur above the hardpan after a hard rain. Woodbridge soils are naturally stony and contain few to many stones throughout the soil. Most use problems are related to the

very slowly permeable hardpan, seasonable high water table, and stoniness.

31XB Woodbridge very stony fine sandy loam, 3 to 8% slopes. This gently sloping soil is similar to the soil described for the series. Stones cover up to 3 percent of the surface unit.

41XB Sutton very stony fine sandy loam, 3 to 8% slopes. Sutton are moderately well-drained soils developed in upland till normally deeper than 5 feet. These soils are moderately permeable in the subsoil, but slowly to very slowly permeable layers may be present below 60 inches. The water table normally rises to within 15 to 20 inches of the surface during the winter and spring months. The Sutton soils are naturally stony and contain few to many stones throughout the soil. Most use problems are related to the seasonal high water table and stoniness. Stones cover up to 3 percent of the surface area.

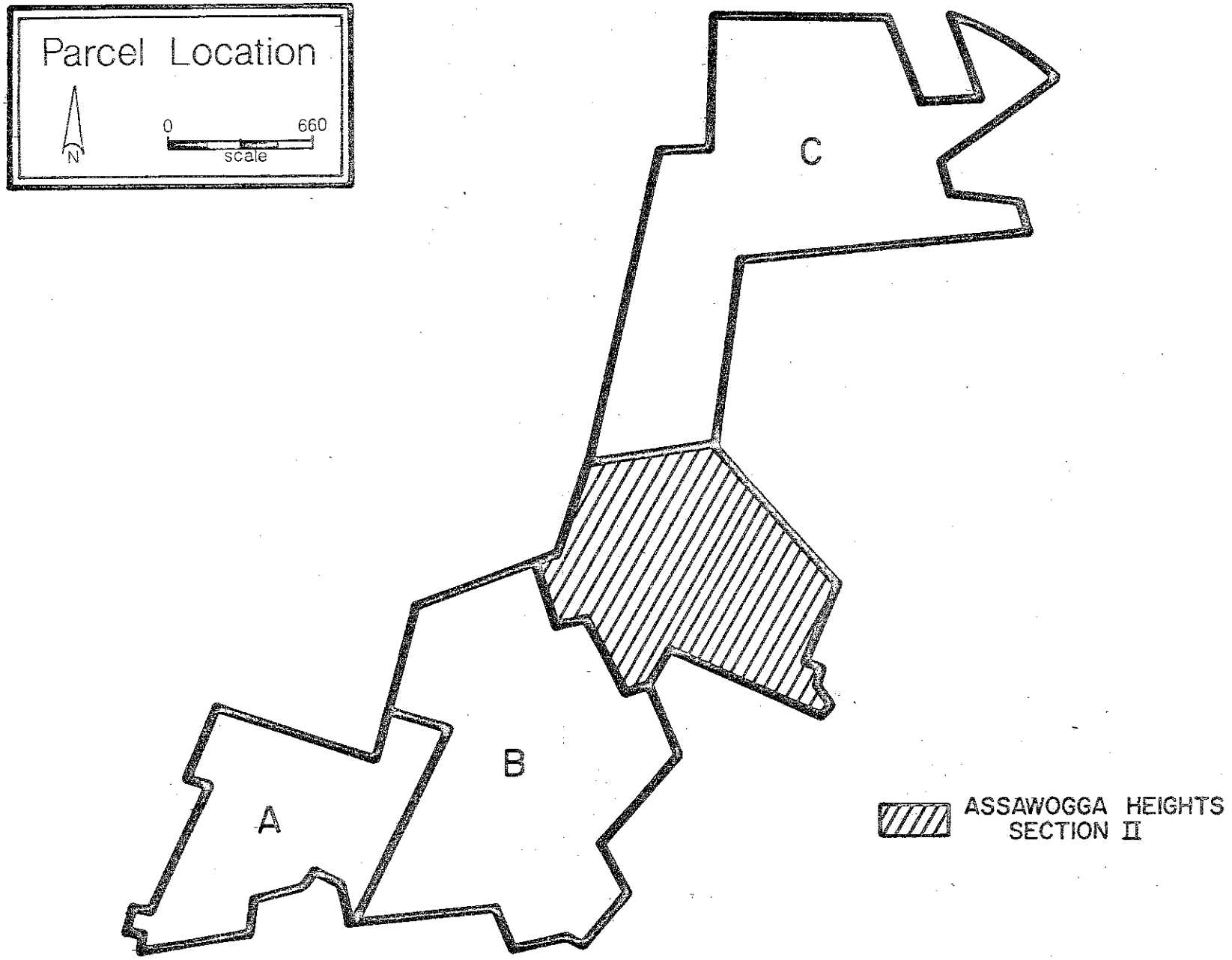
41MC Sutton extremely stony fine sandy loam, 3 to 15% slopes. This soil is similar to the soil described for the series, except the gently sloping and sloping areas occur in patterns too intricate to separate in mapping. More than 3 percent of the surface is covered with stones.

70A Merrimac sandy loam, 0 to 3% slopes. Merrimac are excessively drained soils developed in sandy water deposits, from 18 to 24 inches deep, over coarse-textured stratified sands and gravels. These deposits, normally deeper than 10 feet, are located on terraces above the present overflow of large streams. These soils have moderate to rapid permeability in the subsoil. The water table normally is below 60 inches during most of the year. Most use problems are related to the moderate to rapid permeability and droughtiness. This soil is nearly level.

43M Ridgebury, Leicester & Whitman extremely stony fine sandy loams.* This mapping unit is made up of poorly and very poorly drained soils. These soils occur in an intricate and complex pattern, and separation of each individual soil was not practical on the scale surveyed. Each mapping unit may contain an individual soil or a percentage of each of the three soils. More than 3 percent of the surface is covered with stones. In general, these soils are normally deeper than 5 feet. They have a hardpan at a depth of 18-24 inches. They are found in low-lying nearly level upland areas. They are slowly to very slowly permeable in the subsoil, are naturally stony and contain few to many stones throughout. Most use problems are related to the slowly to very slowly permeable subsoils and long seasonal high water tables. The water table is at or near the surface from late fall through early spring.

754 Scarboro fine sandy loam.* Scarboro are very poorly drained soils developed in sandy water deposits. These deposits, normally deeper than 10 feet, occupy low-lying terraces. Stratified sands and gravels may occur below 5 feet. They have moderate permeability in the subsoil. The water table normally rises to the surface during most of the year. Most use problems are related to the high water table.

* Designated wetland soil by PA PL-155


Parcel Location
N
0
660
scale
A
B
C
ASSAWOGGA HEIGHTS
SECTION II

Parcel A: A low drainageway or band of wetland soils (43M) forms a semi-circle on the eastern portion of parcel A. Runoff is conveyed to an excavated pond on the property, and then eventually to a culvert beneath Rte. 12. The small excavated pond presently acts as a crude storm water retention basin. Between the pond and Rte. 12 is a roughly shaped outlet channel, much of its is obstructed with boulders. It appears this outlet channel is not within the property of Clover Development. Any increase in flow caused because of additional developmental runoff should be adequately accommodated by properly constructing the channel. It is likely that a heavy flow presently spreads out onto an adjacent pasture south of this area. The existing pond could very easily be modified to act as a combination sediment and runoff retention pond.

It would be best to stay back from the edge of the semi-circular wetland when developing this parcel. Construction limits could be appropriately set, with a row of hay bales staked in place where land grading approached the swamp. The natural filter of existing grassed ground above the swamp should be retained.

With the installation of an access drive between parcel A and B, harmful effects to the wetland can be minimized. It appears that the open swampy area immediately north of the planned road could be left undisturbed. This area coupled with its woodland edge provides good wildlife habitat for songbirds, possibly ducks and other smaller terrestrial wildlife. A culvert placed beneath this road must be sized properly and placed on firm base. Its invert elevation should be about level with or slightly below the water surface in the small open area. Stabilization of the slopes as soon as possible after final grading will be important. Hay bales should be staked at the toe of the filled slopes through the wetland if a seasonal delay in vegetating or mulching the slopes is expected. If a considerable volume of water, possibly increased by street storm drainage, is expected to flow through the culvert, placing some rip rap at the outlet would be appropriate. A minimum height of road fill will lessen the base width of the road through the swamp.

Parcel B: Plans show the approximate location of the proposed development road. Where the road curves above the wetland area a few hundred feet before it joins Ballouville Road it could be moved westward, farther away from the steep slope into the wetland. This particular wetland is several acres large with a stream flowing through it. It serves, as did the semi-circular wetland in parcel A, to filter watershed runoff to it and release it slowly to downstream watercourses. This function aids in preventing floods. Any street storm drainage outletting into this area should be noted. Rip rap outlet sections may be in order to avoid erosion and sedimentation at the edges of the wetland.

It is advised that baled hay be staked around newly installed catch basins until roads, curbing, and vegetation (or woodchips, etc.) or other development stabilization is installed.

Residential building lot disruption which would slope into the wetland, without leaving the native forest litter to filter runoff heading downslope, should be discouraged.

Parcel C: Plans show consideration for the wetlands on the east and west side of the proposal. Disrupting as small portions of the field as is practical for individual unit construction would be best. Leaving filter strips of existing vegetation will alleviate a potential erosion problem. The topsoil now present will be an asset in landscaping the project. The planned pond may need some protection

from up-slope runoff during project construction. Liming, fertilizing, and seeding various stages of the project, either with permanent or temporary cover, is important.

It is recommended that the town require adequate plans for erosion and sediment control. This would include runoff (storm drainage) considerations. Some sort of schedule of development should be forthcoming. The Windham Conservation District will review future plans relative to sediment and erosion control on any parcel, if requested by the town or developer.

WATER SUPPLY

Water for all of the proposed residences is planned to be provided by on-site wells. Due to the density of the development, the availability of a sufficient groundwater supply to meet daily needs is a crucial factor. In the single-family area, a lateral extension of the current Assawogga subdivision, 55 half-acre lots are planned. If individual wells were established on each lot, it seems very likely that supply problems would arise. It has been estimated* that bedrock aquifers in till-covered areas in eastern Connecticut are recharged by the equivalent of about 7 inches of precipitation each year. On an average, this would represent approximately 190,000 gallons per acre per year. It may also be assumed that, in an average household, each person uses approximately 60 gallons of water per day. This translates to about 21,000 gallons per person per year (assuming 350 days of water use per year). Hence, the average bedrock recharge would be enough to supply approximately 9 persons per acre, if all of the recharge were retrievable. If a drainage area were fully developed at half-acre residential density, virtually all of the bedrock recharge would be needed.

Not all of the drainage area from which groundwater could enter and flow through the proposed single-family section would be developed. However, the part of the drainage area lying outside of the proposed subdivision is small, and the presence of a wetland within the area indicates that groundwater is discharged from, rather than recharged to, the bedrock at that location. To sum, then, it appears that the bedrock aquifer may not be capable of fully supplying the water that would be needed in the single-family residential section. Even if the supply is sufficient, it would probably be difficult to maintain 55 individual wells on the lots without experiencing interference effects; i.e. the pumping of one well could dry up the supply of a nearby well. The close spacing of the wells that would be necessitated by the small size of the lots would promote such problems. It would be better, if the bedrock aquifer is to be used, to establish one or two community-supply wells with ample storage facilities to serve the subdivision.

The proposed multi-family units also face possible water-supply problems. Assuming 3 persons per unit and 60 gallons per person per day, a demand of 32,400 gallons per day would be produced. To supply this, on-site wells would have to maintain a continuous yield of about 23 gallons per minute. This type of long-term yield would be very unusual for a bedrock well, yields of 1-10 gallons per minute are more typical. It is more likely that a series of bedrock wells could be used, although

* Holzer, T.L., 1975, Limits to growth and septic tanks, in water pollution control in low density areas: proceedings of a rural environmental engineering conference, W.J. Jewell and Rita Swan, eds., Univ. Press of New England.

the availability of such a large total groundwater supply cannot be guaranteed. A total well yield of about 50 gallons per minute with large storage facilities would be desirable if bedrock wells are to be used. These supplies are also considered public water supplies and must be approved by the State Department of Health before construction can begin.

Another possibility for on-site water supply, particularly in the case of the single-family residences, would be the stratified drift deposits along Five Mile River. The distribution of these deposits is shown in an accompanying figure. Unfortunately, only a small portion of the edge of the deposits appears to be within the property itself. However, it is possible that a sufficient thickness of material exists to allow a well or wells to tap an ample supply. Further examination of the deposits should be made and, if potential is indicated, wells should be installed for pumping tests.

It is the opinion of the Team geologist that water supply may be the most critical factor to be considered in this development. Three suggestions may be offered: (1) If the subdivision at its present density is allowed, it would be highly desirable to use community wells for the various sections and, particularly, to perform pumping tests on the wells for several months, including the summer season, to determine whether the local aquifers can, if fact, supply the expected sustained needs. The potential for using the stratified drift aquifer should be examined first. (2) Without pre-development pumping tests, it would be desirable to reduce the density of the subdivision markedly. (3) If pumping tests are not performed or if the tests show an inadequate supply, and the currently proposed density is still desired, the Town may wish to consider expanding the public facilities to meet the projected demand.

All single-family residence wells must be located a minimum of 75 feet away from sewer lines unless the sewer is constructed of extra heavy cast iron leaded or equivalent joints. The total distance that these wells must be located from sewers and other sources of pollution will be dependant on the required withdrawal rate from these wells.

No wells should be located in close proximity to the chicken coop or to any area where manure may have been stored or spread for long periods of time. A well located in these areas has a high probability of being above the acceptable limits for nitrates, for which there is no economically reasonable method of treatment at this time.

WASTE DISPOSAL

Sewers are proposed for the entire development. Care must be exercized in the sewer installation to avoid contamination of wells, due to leakage, where the soil is shallow to bedrock. Proper bedding must be provided for the sewer line, and it should be tested for leakage. Manholes should be watertight and located a minimum of 75 feet away from wells.

The main trunk lines in the street are adequate to handle present and future flows, and the sewage treatment plant will have no problem accepting additional flow.

The bulky waste products currently found in a dump on the site near the chicken coops, should be removed and brought to an approved sanitary landfill.

CONFORMITY TO DEVELOPMENT PLANS

The Killingly Plan of Development's (1974) Master Land Use Plan Map assigns all three sites to low density residential uses, therein defined as two dwelling units per acre. Consequently, only the proposed single-family construction on parcel 'B' is consistent with this map. The Plan also encourages additional commercial development in selected areas while carefully avoiding strip development. The proposed village retail commercial area within parcel 'A' might very well conform to this goal. The provision of additional multi-family units does appear to be consistent with the Plan's general goal to provide increased opportunity for adequate housing for people of all ages, races, and economic levels. The Plan's roadway improvement objectives include Attawaugan/Ballouville Road from the Junction with Route 12 in Attawaugan approximately to the entrance road for Assawogga Heights' first phase. This is much needed, given the hazardous intersection (line-of-sight) at Route 12, the inadequate road width, as well as the hairpin turn near the mill in Attawaugan. The proposal's intention to provide an alternative egress point via parcel 'A' should somewhat alleviate this problem until Attawaugan/Ballouville Road is actually reconstructed. Finally, the Town Plan calls for a recreational area in essentially the same area as that planned by Clover Development. The Plan's intent, however, is to provide a playground and ballfield complex. Most of the 20 acres is unsuitable for anything but passive recreational use, however, there is one section southwest of the proposed apartments on parcel 'C' which might very well be flat and dry enough for these active recreational uses.

The Regional Plan of Development suggests, in villages such as Attawaugan referred to as "secondary urbanized areas," where sewers have already been extended to contiguous areas with a density less than 2 dwelling units per acres, that in-fill development occur at greater densities to bring the overall density into the urban low category. This applies to much of Clover's proposal insofar as sewers have been extended to their vacant tracts. The Regional Plan also supports the provision of convenient services in association with growth and development, particularly in areas where easy automobile and pedestrian access is available.

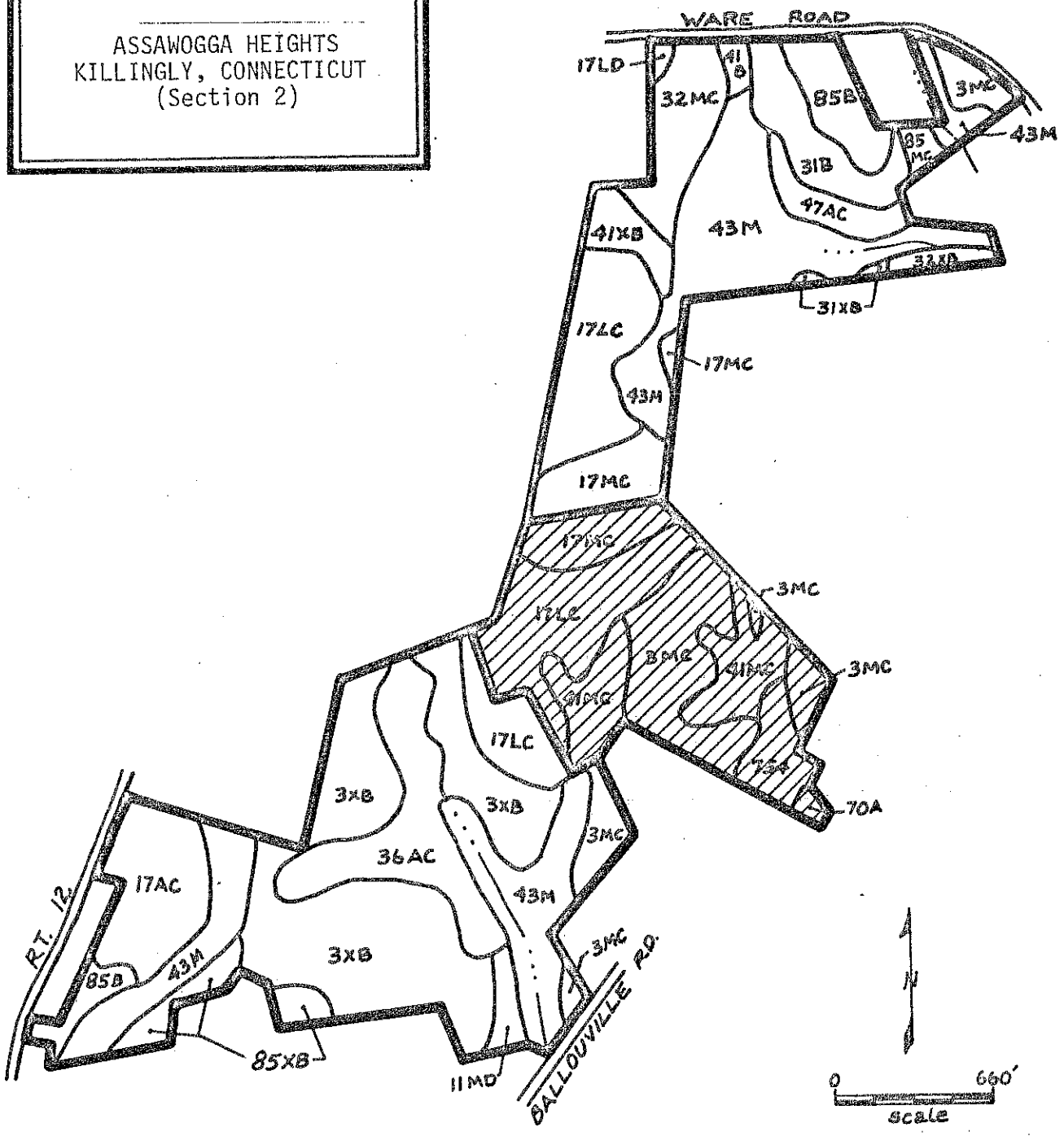
LAND USE REGULATION

As with earlier Assawogga Heights proposal, it is expected that the Killingly Inland Wetlands Commission will control those areas in or within 200' of wetlands soils. Generally, the disruption of all wetlands should be minimized so as to assure the preservation of the wetlands' ability to detain water and to filter out pollutants towards the universal goals of minimizing flooding and maintaining water quality. The Five Mile River, into which this development will drain, has experienced both water quality and flooding problems. As the Team has not seen construction plans, site plans, or a subdivision plan map, we cannot ascertain just how well these proposals will meet or exceed the letter and spirit of the Town's comprehensive subdivision and zoning regulations. The entire site is zoned for low density residential uses. As a consequence, only parcel 'B' would not be in need of a zone change. With sewers, as planned, parcel 'B' could have lots as small as 20,000 square feet in size with a minimum 100 feet frontage. Parcel 'A', on the other hand, would require a zone change to commercial (either Village or General) in order to permit the conversion of the coop to retail uses, and another zone change to medium density residential for the two five-acre elderly apartment projects. Parcel 'C' too would require a zone change to medium density residential, otherwise the project's size would need to be reduced.

Appendix

Soils

ASSAWOGGA HEIGHTS
KILLINGLY, CONNECTICUT
(Section 2)



This map is an enlargement from the original 1,320'/inch scale to 660'/inch.

Information taken from: Soil Interpretations, Windham County, Connecticut, 1975; soil survey sheets nos. 2858, 2860; prepared by the United States Department of Agriculture, Soil Conservation Service. Advance copy, subject to change.

SOIL LEGEND

Soil Map Symbol	Soil Name
85XB 32XB 3XB	Canton and Charlton very stony fine sandy loams, 3 to 8% slopes.
32MC 3MC 85MC	Canton and Charlton extremely stony fine sandy loams, 3 to 15% slopes.
11MD	Gloucester extremely stony sandy loam, 15 to 35% slopes.
17LC	Charlton-Hollis fine sandy loams, very rocky, 3 to 15% slopes.
17MC	Hollis-Rock outcrop complex, 3 to 15% slopes.
31B	Woodbridge fine sandy loam, 3 to 8% slopes.
31XB	Woodbridge very stony fine sandy loam, 3 to 8% slopes.
41XB	Sutton very stony fine sandy loam, 3 to 8% slopes.
41MC	Sutton extremely stony fine sandy loam, 3 to 15% slopes.
70A	Merrimac sandy loam, 0 to 3% slopes.
85B	Canton and Charlton fine sandy loams, 3 to 8% slopes.

WETLAND SOILS

43M*	Ridgebury, Leicester and Whitman extremely stony fine sandy loams.
754*	Scarboro fine sandy loam.

* Wetland soils by PA 155.

CLOVER DEVELOPMENT
ASSAWOGGA HEIGHTS EXPANSION
KILLINGLY, CONNECTICUT

PROPORTIONAL EXTENT OF SOILS AND THEIR LIMITATIONS FOR CERTAIN LAND USES

Soil Series	Soil Symbol	Approx. Acres	Percent of Acres	Principal Limiting Factor	Urban Use Limitations*			
					On-Site Sewage	Buildings with Basements	Streets & Parking	Land-Scaping
Canton & Charlton	85XB 32XB 3XB	30	30	Large stones	2	2	2	2
Canton & Charlton	82MC 85MC 3MC	7	7	Large stones	3	3	3	3
Gloucester	11MD	2	2	Slope	3	3	3	3
Charlton-Hollis	17LC	12	12	Slopes, large stones	3	3	2	3
Hollis-Rock Outcrop	17MC	5	5	Depth to rock	3	3	3	3
Woodbridge	31B	3	3	Percs. slowly, frost action, wet	3	3	3	1
Woodbridge	31XB	3	3	Percs. slowly, frost action, wet, large stones	3	3	3	2
Sutton	41XB	1	1	Wetness, large stones, frost action	3	3	2	2
Sutton	41MC	7	7	Wetness, large stones, slope	3	3	2	3
Merrimac	70A	1	1		1	1	1	1

Assawogga Heights, continued

PROPORTIONAL EXTENT OF SOILS AND THEIR LIMITATIONS FOR CERTAIN LAND USES

Soil Series	Soil Symbol	Approx. Acres	Percent of Acres	Principal Limiting Factor	Urban Use Limitations*			
					On-Site Sewage	Buildings with Basements	Streets & Parking	Land-Scaping
Canton & Charlton	85B	5	5		1	1	1	1
Ridgebury, Leicester & Whitman*	43M	24	24	Percs. slowly, wetness, frost action	3	3	3	3

* Wetland soils designated by PA 155.

Urban Use Limitations: 1=slight, 2=moderate, 3=severe.

SOIL INTERPRETATIONS FOR URBAN USES

The ratings of the soils for elements of community and recreational development uses consist of three degrees of "limitations:" slight or no limitations; moderate limitations; and severe limitations. In the interpretive scheme various physical properties are weighed before judging their relative severity of limitations.

The user is cautioned that the suitability ratings, degree of limitations and other interpretations are based on the typical soil in each mapping unit. At any given point the actual conditions may differ from the information presented here because of the inclusion of other soils which were impractical to map separately at the scale of mapping used. On-site investigations are suggested where the proposed soil use involves heavy loads, deep excavations, or high cost. Limitations, even though severe, do not always preclude the use of land for development. If economics permit greater expenditures for land development and the intended land use is consistent with the objectives of local or regional development, many soils and sites with difficult problems can be used.

Slight Limitations

Areas rated as slight have relatively few limitations in terms of soil suitability for a particular use. The degree of suitability is such that a minimum of time or cost would be needed to overcome relatively minor soil limitations.

Moderate Limitations

In areas rated moderate, it is relatively more difficult and more costly to correct the natural limitations of the soil for certain uses than for soils rated as having slight limitations.

Severe Limitations

Areas designated as having severe limitations would require more extensive and more costly measures than soils rated with moderate limitations in order to overcome natural soil limitations. The soil may have more than one limiting characteristic causing it to be rated severe.

About the Team

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a variety of federal, state, and regional agencies. Specialists on the Team include geologists, biologists, foresters, climatologists, soil scientists, landscape architects, archeologists, recreation specialists, engineers and planners. The ERT operates with state funding under the supervision of the Eastern Connecticut Resource Conservation and Development (RC&D) Area.

The Team is available as a public service at no cost to Connecticut towns.

PURPOSE OF THE TEAM

The Environmental Review Team is available to help towns and developers in the review of sites proposed for major land use activities. To date, the ERT has been involved in reviewing a wide range of projects including subdivisions, sanitary landfills, commercial and industrial developments, sand and gravel operations, elderly housing, recreation/open space projects, watershed studies and resource inventories.

Reviews are conducted in the interest of providing information and analysis that will assist towns and developers in environmentally sound decision-making. This is done through identifying the natural resource base of the project site and highlighting opportunities and limitations for the proposed land use.

REQUESTING A REVIEW

Environmental reviews may be requested by the chief elected officials of a municipality or the chairman of town commissions such as planning and zoning, conservation, inland wetlands, parks and recreation or economic development. Requests should be directed to the Chairman of your local Soil and Water Conservation District. This request letter should include a summary of the proposed project, a location map of the project site, written permission from the landowner allowing the Team to enter the property for purposes of review, and a statement identifying the specific areas of concern the Team should address. When this request is approved by the local Soil and Water Conservation District and the Eastern Connecticut RC&D Executive Council, the Team will undertake the review on a priority basis.

For additional information regarding the Environmental Review Team, please contact Jeanne Shelburn (889-2324), Environmental Review Team Coordinator, Eastern Connecticut RC&D Area, 139 Boswell Avenue, Norwich, Connecticut 06360.