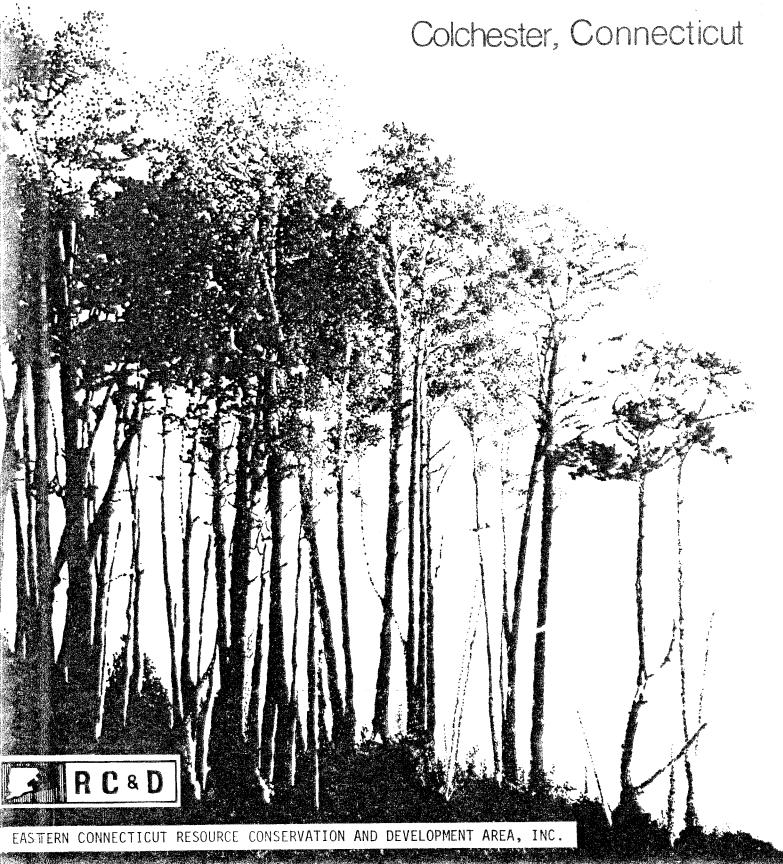


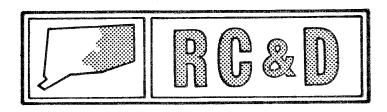
Reed Subdivision



Environmental Review Team Report

Reed Subdivision Colchester Connecticut

March 1985

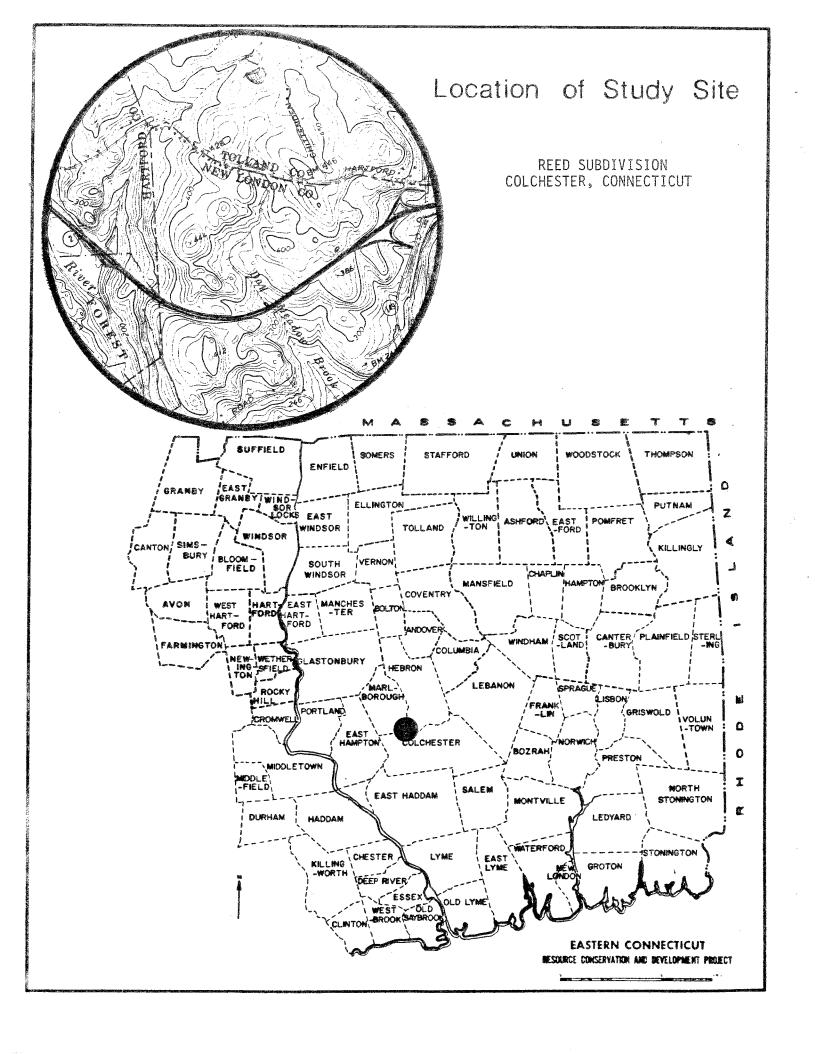


Eastern Connecticut Resource Conservation & Development Area

Environmental Review Team

PO Box 198

Brooklyn, Connecticut 06234



ENVIRONMENTAL REVIEW TEAM REPORT ON REED SUBDIVISION COLCHESTER, CONNECTICUT

This report is an outgrowth of a request from the Colchester Inland Wetlands Commission to the New London 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 was reviewed by the Eastern Connecticut Environmental Review Team (ERT).

The soils of the site were mapped by a soil scientist from the United States Department of Agriculture, Soil Conservation Service (SCS). Reproductions of the soil survey map, a table of soils limitations for certain land uses and a topographic map showing property boundaries were distributed to all Team members prior to their review of the site.

The ERT that field-checked the site consisted of the following personnel: Barry Cavanna, District Conservationist, Soil Conservation Service (SCS); Bill Warzecha, Geologist, Connecticut Department of Environmental Protection (DEP); Don Capellaro, Sanitarian, State Department of Health; Charles Storrow, Regional Planner, Southeast Connecticut Regional Planning Agency; and Jeanne Shelburn, ERT Coordinator, Eastern Connecticut RC&D Area.

The Team met and field checked the site on Tuesday, January 8, 1985. Reports from each contributing 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 Colchester. 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 Area Committee hopes that this report will be of value and assistance in making any decisions regarding this particular site.

If you require any additional information, please contact: Ms. Jeanne Shelburn, Environmental Review Team Coordinator, Eastern Connecticut RC&D Area, Route 205, Box 198, Brooklyn, CT 06234, 774-1253.

INTRODUCTION

The Eastern Connecticut Environmental Review Team was asked to prepare an environmental assessment for a proposed subdivision in the Town of Colchester. The site is approximately 120 acres in size and is located on the south side of Old Hartford Road near the Colchester/Marlborough town line. The property is presently owned by Charles Reed. Preliminary plans have been prepared by Richard Mihok and Associates, a Marlborough engineering firm.

The preliminary plan shows 75 lots of 1 acre or more. A "U" shaped roadway will extend into the site from Old Hartford Road to provide access to interior lots. All lots will be served by on-site septic systems and on-site wells.

The site ranges from moderately to steeply sloping as one moves south from Old Hartford Road. A number of wetland areas and intermittent streams are found throughout the property. Meadow Brook passes through the central section of the site. The property has been logged recently, but was not clear cut. Soils range from poorly drained to moderately well drained. Some areas were found to have seasonal high water tables.

The Team was concerned with the effect of this proposed development on the natural resource base of this site. Although many severe limitations to development can be overcome with proper engineering techniques, these measures can become costly, making a project financially unfeasible for a developer. Severe limitations to development of this site include steep slopes, wetland soils, intermittent and perennial stream courses, shallow soil depth to bedrock areas and stoniness. These constraints and their effect on the proposed development are discussed in detail in the following sections of this report. It would appear, however, that a reduction in development density would be appropriate in order to meet zoning and public health requirements.

o 660' 800'e	COLOS
Site Boundary	
Topography	

ENVIRONMENTAL ASSESSMENT

TOPOGRAPHY/GEOLOGY

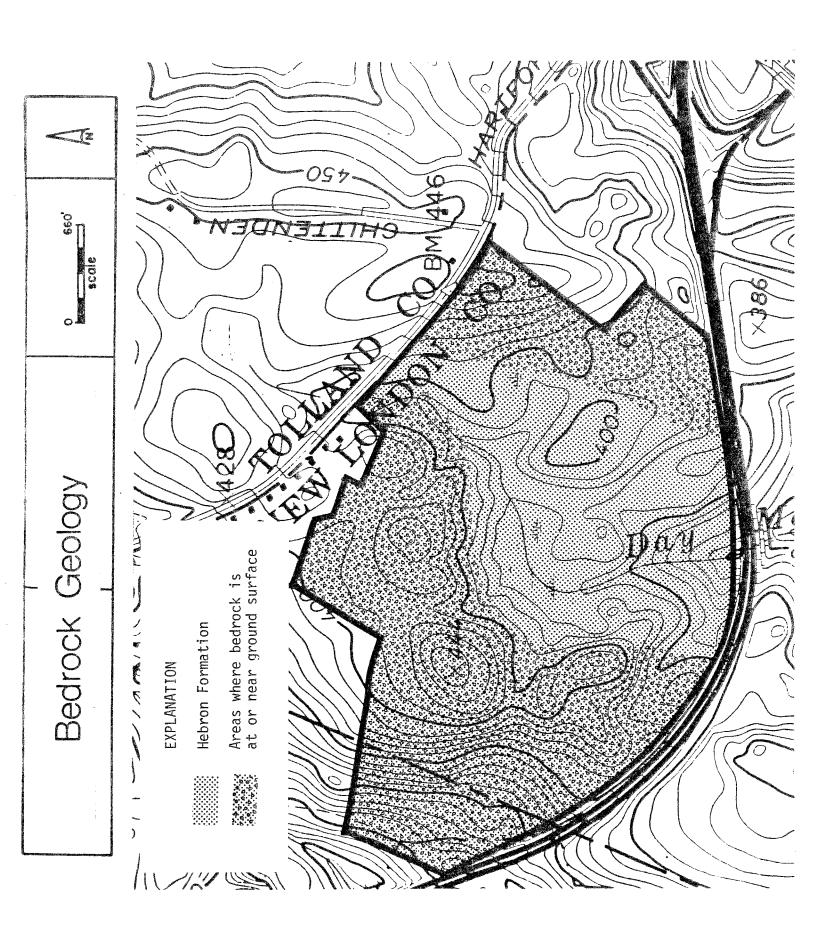
The study site is located in northern Colchester on the south side of Old Hartford Road. The Colchester-Marlborough town line crosses the western section of the site. Three large lots are proposed in the Town of Marlborough while the remainder of the proposed lots lie within Colchester.

Day Meadow Brook, which bisects the property, is the major perennial stream-course on the site. Slopes east of Day Meadow Brook range from gentle to moderate. West of the brook, slopes are much steeper and are controlled primarily by the underlying bedrock. As a result, the terrain throughout this portion of the property is quite rugged.

Maximum and minimum elevations on the site are approximately 444 feet and 310 feet above mean sea level, respectively.

The Reed property lies within the Moodus topographic quadrangle. A bedrock geologic map (QR-27, by L. W. Lundgren and L. P. Ashmead) has been published by the Connecticut Geological and Natural History Survey. A surficial geologic map (GQ-1205, by Dennis O'Leary) has been published by the U.S. Geological Survey. Major bedrock outcrops observed on the site were located west of Day Meadow Brook. Single isolated outcrops are visible in scattered areas east of the brook. The presence of bedrock outcrops indicates that the unconsolidated material overlying the rock is relatively thin. The outcrops, as well as the bedrock underlying the site, are part of the Hebron Formation. These rocks are described as interbedded brownish gray schist and greenish gray calc-silicate gneiss. The "schist" layers are composed of the minerals quartz, biotite and plagioclase, while the "gneiss" layers are composed largely of the minerals labradorite, quartz, biotite, actinolite, hornblende, and diopside. Both gneisses and schists are crystalline, metamorphic rocks (rocks altered by great heat and/or pressure within the earth's crust). These rock types (schists and gneisses) may blend into one another in a single outcrop. "Gneissic" rocks are commonly recognizable by distinct banding which occurs due to alternating layers of light granular minerals and dark platy minerals. Schists have high percentages of flaky or elongate minerals, which are aligned to produce a strongly layered internal structure. As a result of this structure, schistose rocks usually part easily along layers.

The surficial geologic material covering the site is till. Till is a deposit which consists of rock particles of varied shapes and sizes and which was deposited directly from glacier ice without being reworked by glacial meltwater. Based on visual inspection of remnant deep test pits, some of the till based soils covering the site appear to have a sandy texture. On the other hand, some of the till based soils, especially where their depth exceeds five



feet or greater, may be siltier, more compact and only slightly permeable.

Thickness of the till on the site is probably not much more than 10 feet. It is shallowest west of Day Meadow Brook and near the eastern border of the site.

Overlying till and/or bedrock are sediments that were formed after the glacier retreated from the region. These deposits, which are referred to as swamp deposits, consist of sandy to clayey silt, peat, and organic debris. They were generally deposited in water logged depressions. Swamp deposits on the site parallel Day Meadow Brook to a large extent.

Development Concerns

Some of the geological limitations present on the site that may pose constraints with regard to the proposed subdivision include (1) areas where bedrock is at or near ground surface (see accompanying surficial geologic map); (2) areas where slopes are moderate and steep (see accompanying topographic map); (3) the presence of some till-based soils, which may contain numerous surface boulders, seasonally high water tables (depending on topographic position) and/or have slow percolation rates; and (4) the presence of inland-wetland soils.

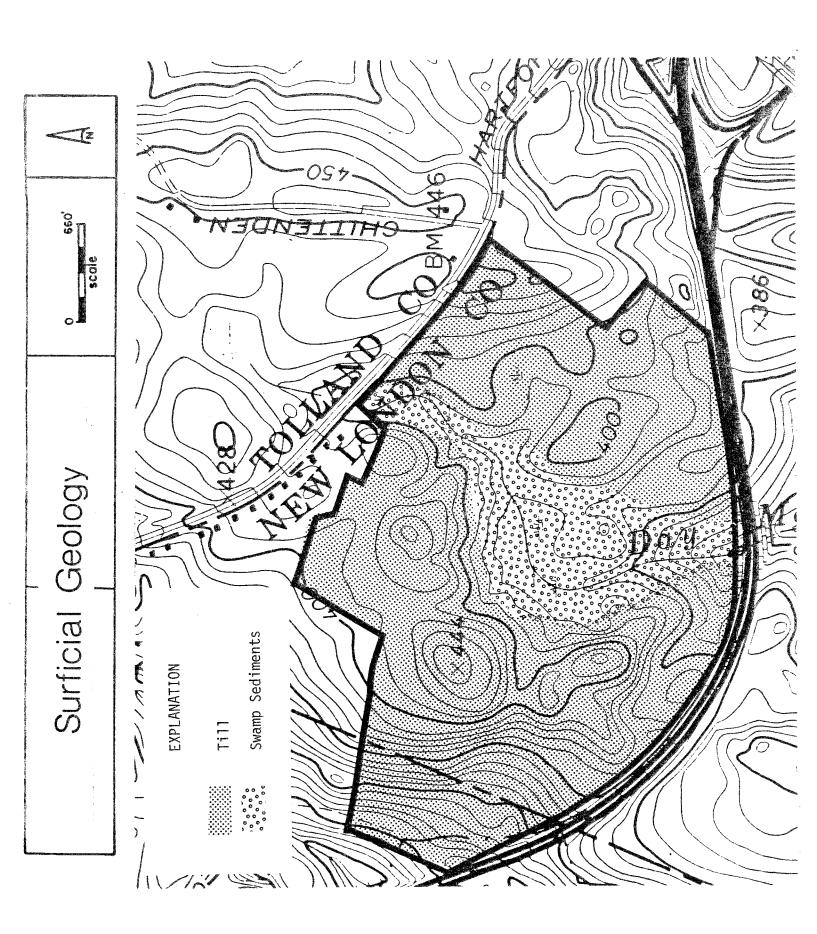
Since public water and sewer service is not available to the parcel, each of the proposed lots in the subdivision will require the installation of an on-site well and sewage disposal system. As a result, the geologic limitations mentioned above will probably weigh heaviest on the installation of subsurface sewage disposal systems.

Therefore, engineered septic systems will probably need to be considered when (1) bedrock is encountered at depths less than 7 feet from the surface; (2) the maximum groundwater is less than three feet below ground surface; (3) the minimum soil percolation rate is slower than one inch in thirty minutes; (4) soils with slopes exceeding 25 percent are encountered. Development in areas designated as inland-wetland soils on the accompanying soils map should be avoided.

The above mentioned geologic limitations may also pose hindrances to road construction and foundation placement. However, with good engineering and planning many of the limitations mentioned should be surmountable.

Based on the site plan submitted to team members on the field review day, the proposed interior road system calls for four wetland crossings. Additional crossings of wetland soils by driveways may also be required, depending on the final project layout. Although undesirable, wetland road crossings can be feasible when they are properly engineered.

When crossing wetland soils with roads or driveways, provisions should be made for removing unstable material beneath the road bed, backfilling with a permeable road base fill material, and installing culverts as necessary.



The roads should be at least 1.5 feet and preferably 2 feet above the surface elevation of wetlands. This will allow for better drainage of the roads. It will also decrease the frost heaving potential of the road. 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. It is particularly important that culverts be properly sized and located so as not to alter the water levels in the wetland.

Blasting may also be necessary in order to construct the interior road system throughout the steeply sloping areas west of Day Meadow Brook since bedrock is at or near ground surface throughout this area. If blasting does occur in these areas, it is recommended that a comprehensive erosion and sediment control plan be formulated and followed closely during the blasting and construction periods particularly in view of the moderate/steep slopes which prevail throughout.

HYDROLOGY

As shown by the accompanying Drainage Area map, the parcel can be divided into three watershed areas. Surface runoff from approximately 32 acres in the eastern portion of the site drains towards a culvert passing under Route 2 at the southern boundary. Once the water passes under Route 2 it flows generally southward until it finally merges with Day Meadow Brook. Drainage in the central parts of the site flows downslope into Day Meadow Brook, which bisects that portion of the property. Day Meadow Brook passes through a culvert under Route 2 and ultimately discharges into Jeremy River south of the property. Finally, surface drainage in the western parts of the property flows generally westward towards an unnamed tributary to Blackledge River.

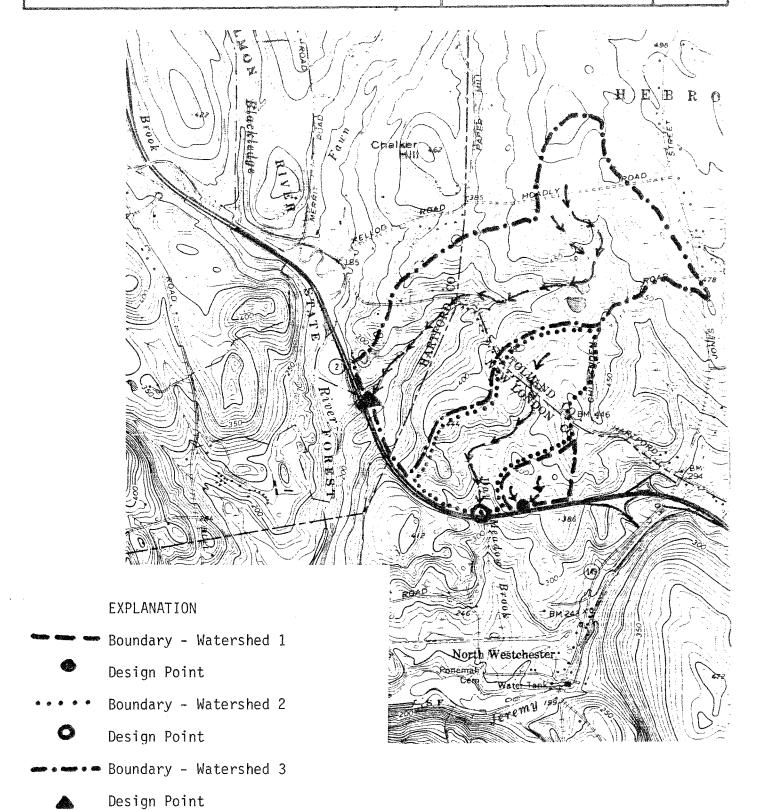
Development as proposed will generate at least a slight increase in runoff from the site for a given rainfall amount, and thereby increase the peak storm water flows to nearby streams. Some major factors which will affect the amounts of increase include: (1) the modification in land use which includes the removal of vegetation and the construction of impermeable surfaces such as roof tops, paved driveways, and access roads; (2) the design of storm sewering in the subdivision; and (3) the timing of development on each lot.

The site plan distributed to Team members the day of the field review was not, by itself, sufficient to allow the determination of the effects from storm sewering. Nevertheless, an estimate may be made of the runoff change and the peak flow discharge to nearby streams likely to occur as a result of the land use modification. Technical Release No. 55 of the Soil Conservation Service provides a technique which may be used in formulating runoff estimates. This method involves the determination of runoff curve numbers, which relate the amount of precipitation to amounts of runoff. A higher curve number indicates that a given amount of runoff will be greater. Applying the numbers of rainfall data for given storm events, average slopes in each watershed, as well as several other factors, an estimate of peak flows in a stream can be made. For the purposes of analyzing the peak flows likely to occur under the proposal, a

Drainage Areas







Watercourses - showing direction

of flow

design point and its corresponding watershed was chosen. Those design points or points of outflow are shown on the Drainage Area map. It should be pointed out that the project engineer may analyze runoff differently since there are several other methods available for estimating the amounts of increased runoff, i.e., rational method, etc.

The results of the Team Geologist's calculations, shown below for each design point chosen, should be considered as "ball park" figures with regard to the estimated peak flows and runoff volumes. The calculated percentages of increase should be fairly close, however.

TABLE 1

Estimated pre- and post-development peak flows in streamcourses which drain each of the watershed areas shown in the Drainage Area map. All peak flows are given in units of cubic feet per second.

WATERSHED I	10-year 24 hr. storm	25-year 24 hr. storm		
Present (Pre-development) curve number (56)	20	30	39	52
Future (Post-development) curve number (57)	22	32.5	42	56
Present increase	10 percent	8 percent	8 percent	8 percent
WATERSHED II Present (Pre-development) curve number (59)	91	131	164	225
Future (Post-development) curve number (60)	99	141	175	240
Present increase	9 percent	8 percent	7 percent	7 percent

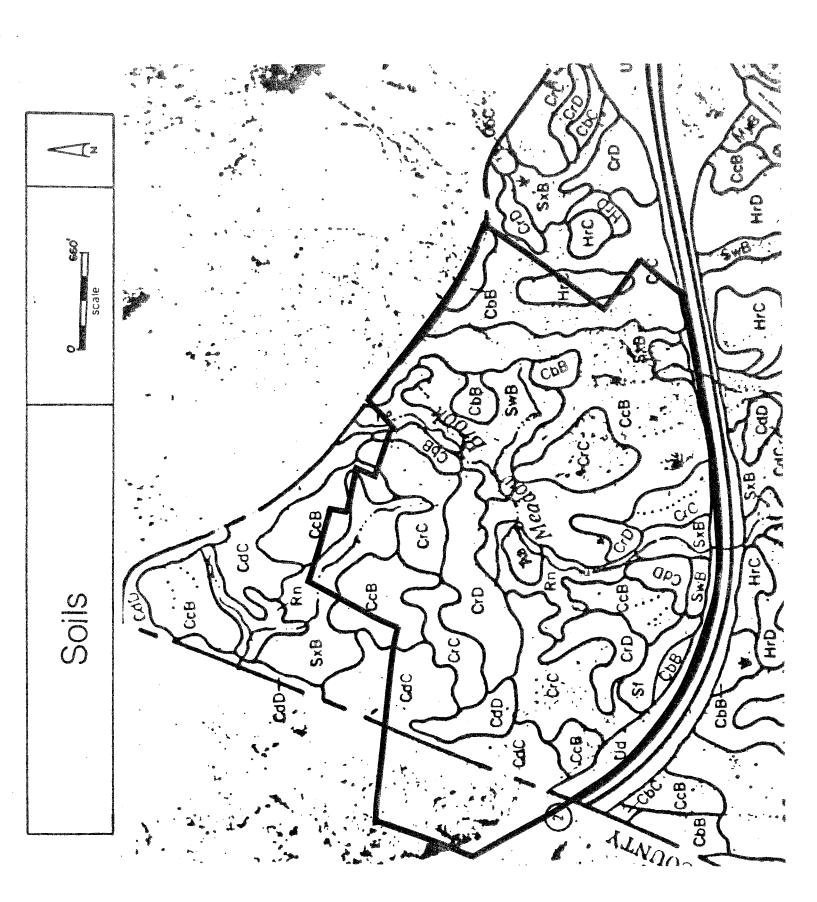
WATERSHED III	10-year 24 hr. storm	25-year 24 hr. storm	50-year 24 hr. storm	100-year 24 hr. storm
Present (Pre-development)	187	263	328	446
Future (Post-development) curve number (betwee	en 61 and 62)	minor changes		
Percent increase		minor changes		

Based on the calculations, it is estimated that development in watersheds I and II would increase the curve number under T.R. #55 by only 1. Development in watershed III would increase the curve number by less than 1. As shown by the accompanying table, peak flow increases at each design point shown would be 10 percent or less for the storm events indicated. Although these increases are not excessive, the increases may cause some additional stream bank erosion. Therefore, prior to subdivision approval, it is recommended that the applicant be required to submit detailed hydrological information on pre- and post-development runoff volumes and peak flows from the site. Estimates should be provided for a 10, 25, 50 and 100 year design storm. Detailed design specifications for all stormwater control facilities should also be submitted. All storm drain outlets should include a designed energy dissapator to help protect areas below the outlets from gullying. Close examination of the culverts passing under Route 2 is recommended to ensure that they can handle post-development flows. It should be pointed out that future development in watersheds I and II could also affect the peak flows of the streams analyzed. It is not expected that future development could occur in watershed II because all of the land within the watershed is part of the proposed development. It is recommended that each developer do his part to control runoff within the watersheds since the cumulative affects of future developments may adversely affect peak flows to each of the streamcourses.

Where slopes are steep, the potential for erosion problems exist, unless adequate precautions are taken. For this reason, it is recommended that a comprehensive erosion and sediment control plan be formulated for the project.

SOILS

Soil series typical of this site include the Adrian-Palms series, the Canton-Charlton series, the Charlton-Hollis series, the Ridgebury, Leicester and Whitman series and the Sutton series. These soils are described in detail below. The Adrian-Palms series, and Ridgebury, Leicester and Whitman series soils are regulated wetland soils under P.A. 155.



Adrian and Palms mucks. These nearly level, very poorly drained soils are in pockets and depressions of stream terraces, outwash plains, and glacial till uplands. Slopes range from 0 to 2 percent.

The mapped acreage of this undifferentiated group is about 55 percent Adrian soils, 30 percent Palms soils, and 15 percent other soils. Mapped areas consist of either Adrian soils or Palms soils, or both. These soils were mapped together because there are no major differences in most uses and management.

Typically, the Adrian soils have black and very dark grayish brown layers of muck 42 inches thick. The substratum is gray, light yellowish brown, and strong brown gravelly sand to a depth of 60 inches or more.

Typically, the Palms soils have black and very dark brown layers of muck 22 inches thick. The substratum is dark yellowish brown and olive very fine sandy loam and loamy very fine sand to a depth of 60 inches or more.

Included with these soils in mapping are small areas of poorly drained Ridgebury, Leicester, Raypol, Walpole, Limerick Variant, and Rippowam soils and very poorly drained Carlisle, Whitman, and Scarboro soils.

Adrian soils have a high water table which is at or near the surface for most of the year. Permeability is moderately rapid in the organic layers and rapid in the substratum. The available water capacity is high. Runoff is very slow or ponded. Adrian soils are strongly acid through slightly acid.

Palms soils have a high water table which is at or near the surface for most of the year. Permeability is moderately rapid in the organic layers and moderately slow in the substratum. The available water capacity is high. Runoff is very slow or ponded. Palms soils are strongly acid through slightly acid.

These soils are poorly suited to community development. The major limiting factors are low strength and a high water table which is at or near the surface for most of the year. If drained, the organic material shrinks and subsides. Wetness and low strength make the establishment and maintenance of lawns and gardens difficult.

Canton and Charlton very stony fine sandy loam. These sloping, well drained soils are on glacial till upland hills, plains, and ridges. Stones and boulders cover 1 to 8 percent of the surface.

The mapped acreage of this undifferentiated group is about 55 percent Canton soil, 25 percent Charlton soil, and 20 percent other soils. Mapped areas consist of either Canton soil or Charlton soil, or both. These soils were mapped together because there are no major differences in use and management.

Typically, the Canton soil has a black, fine sandy loam surface layer 1 inch thick. The subsoil is dark yellowish brown fine sandy loam and sandy loam 23 inches thick. The substratum is grayish brown gravelly sand to a depth of 60 inches or more.

Typically, the Charlton soil has a very dark grayish brown, fine sandy loam surface layer 3 inches thick. The subsoil is dark yellowish brown, yellowish brown, and light olive brown fine sandy loam 26 inches thick. The substratum is grayish brown fine sandy loam to a depth of 60 inches or more.

Included with these soils in mapping are small areas of well drained Narragansett, Paxton, and Montauk soils and moderately well drained Sutton soils.

Permeability of the Canton soil is moderately rapid in the surface layer and subsoil and rapid in the substratum. The available water capacity is moderate. Runoff is rapid. The soil warms up and dries out rapidly in the spring. It is strongly acid or medium acid.

Permeability of the Charlton soil is moderate or moderately rapid. The available water capacity is moderate. Runoff is rapid. The soil warms up and dries out rapidly in the spring. It is strongly acid or medium acid.

Steepness of slope is a major limiting factor for community development. Onsite septic systems need careful design and installation to prevent effluent from seeping to the surface in areas downslope from the leaching system. Stones and boulders need to be removed for landscaping. Quickly establishing a plant cover and using mulch and netting, temporary diversions, and sediment basins help to control erosion during construction.

Charlton-Hollis fine sandy loams, very rocky. This gently sloping to sloping complex consists of somewhat excessively drained and well drained soils on glacial till uplands. Rock outcrops cover up to 10 percent of the surface. Stones and boulders cover 1 to 8 percent of the surface.

The soils of this complex are so intermingled on the landscape that it was not practical to separate them in mapping at the scale used. This complex is about 55 percent Charlton soil, 20 percent Hollis soil, and 25 percent other soils and rock outcrops.

Typically, the Charlton soil has a very dark grayish brown, fine sandy loam surface layer 3 inches thick. The subsoil is dark yellowish brown, yellowish brown, and light olive brown fine sandy loam 26 inches thick. The substratum is grayish brown fine sandy loam to a depth of 60 inches or more.

Typically, the Hollis soil has a very dark brown, fine sandy loam surface layer 2 inches thick. The subsoil is dark brown and dark yellowish brown fine sandy loam 15 inches thick. Hard, unweathered bedrock is at a depth of 17 inches.

Included with these soils in mapping are small areas of well drained Canton, Narragansett, Paxton, and Montauk soils; moderately well drained Sutton and Woodbridge soils; and poorly drained Leicester soils. Many small areas have bedrock at a depth of 20 to 40 inches. A few small areas in the northwestern part of the county have redder colors in the subsoil.

Permeability of the Charlton soil is moderate or moderately rapid. The available water capacity is moderate. Runoff is medium or rapid. Charlton soil warms up and dries out rapidly in the spring. It is strongly acid or medium acid.

Permeability of the Hollis soil is moderate or moderately rapid above the bedrock. The available water capacity is low. Runoff is medium or rapid. Hollis soil warms up and dries out rapidly in the spring. It is strongly acid or medium acid.

The major limiting factor for community development is the shallow depth to bedrock. Extensive onsite investigations are often needed to locate a suitable site for an onsite septic system. Onsite septic systems need special design and installation to prevent effluent from seeping to the surface in areas downslope from the leaching system. Excavations require blasting in many places. Quickly establishing a plant cover and using mulch and netting, temporary diversions, and sediment basins help to control erosion during construction. Stones and boulders need to be removed for landscaping. The Hollis soil has a shallow rooting depth to bedrock and is droughty. Rock outcrops provide attractive settings for homes in many places.

Ridgebury, Leicester, and Whitman extremely stony fine sandy loams. These nearly level, poorly drained and very poorly drained soils are in drainageways and depressions of glacial till upland hills, ridges, plains, and drumloidal landforms. Stones and boulders cover 8 to 25 percent of the surface. Slopes range from 0 to 3 percent.

The mapped acreage of this undifferentiated group is about 35 percent Ridgebury soil, 30 percent Leicester soil, 20 percent Whitman soil, and 15 percent other soils. Some mapped areas consist of one of these soils, and other areas consist of two or three. These soils were mapped together because there are no major differences in use and management.

Typically, this Ridgebury soil has a black, fine sandy loam surface layer 4 inches thick. The subsoil is gray and brown, mottled fine sandy loam 16 inches thick. The substratum is very firm, brittle, grayish brown, mottled sandy loam to a depth of 60 inches or more.

Typically, this Leicester soil has a very dark gray, fine sandy loam surface layer 6 inches thick. The subsoil is dark grayish brown, grayish brown, and pale olive, mottled fine sandy loam 26 inches thick. The substratum is light olive gray, mottled gravelly fine sandy loam to a depth of 60 inches or more.

Typically, this Whitman soil has a black, fine sandy loam surface layer 9 inches thick. The subsoil is dark grayish brown, mottled fine sandy loam 7 inches thick. The substratum is very firm, brittle, grayish brown, mottled fine sandy loam to a depth of 60 inches or more.

Included with these soils in mapping are small areas of moderately well drained Rainbow, Sutton, and Woodbridge soils and very poorly drained Adrian and Palms soils. A few areas in the southeastern part of the county have a silt loam surface layer and subsoil. Many small areas have fewer stones on the surface.

The Ridgebury soil has a seasonal high water table at a depth of about 6 inches. Permeability is moderate or moderately rapid in the surface layer and subsoil and slow or very slow in the substratum. The available water capacity is moderate. Runoff is very slow or slow. Ridgebury soil warms up and dries out slowly in the spring. It is strongly acid through slightly acid.

The Leicester soil has a seasonal high water table at a depth of about 6 inches. Permeability is moderate or moderately rapid. The available water capacity is moderate. Runoff is very slow or slow. Leicester soil warms up and dries out slowly in the spring. It is very strongly acid through medium acid.

The Whitman soil has a high water table at or near the surface for most of the year. Permeability is moderate or moderately rapid in the surface layer and subsoil and slow or very slow in the substratum. The available water capacity is moderate. Runoff is very slow, or the soil is ponded. Whitman soil warms up and dries out very slowly. It is very strongly acid through slightly acid.

The major limiting factors for community development are the high water table and the slow or very slow permeability in the substratum. Onsite septic systems need special design and installation, and sites generally require extensive filling. Slopes of excavated areas slump when wet. Foundation drains help to prevent wet basements. Stones and boulders need to be removed for landscaping. Quickly establishing a plant cover and using mulch, temporary diversions, and sediment basins help to control erosion during construction.

<u>Sutton very stony fine sandy loam</u>. This nearly level to gently sloping, moderately well drained soil is on upland glacial till plains, hills, and ridges. Stones and boulders cover 1 to 8 percent of the surface.

Typically, this Sutton soil has a very dark grayish brown, fine sandy loam surface layer 4 inches thick. The subsoil is yellowish brown, dark yellowish brown, and dark brown, mottled fine sandy loam and sandy loam 29 inches thick. The substratum is olive brown, mottled sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of well drained Canton, Charlton, and Narragansett soils; moderately well drained Woodbridge and Rainbow soils; and poorly drained Leicester soils. A few areas in the southeastern part of the county have a silt loam surface layer and subsoil. Included areas make up about 10 percent of this map unit.

The Sutton soil has a seasonal high water table at a depth of about 18 inches. Permeability is moderate or moderately rapid. The available water capacity is moderate. Runoff is slow or medium. Sutton soil warms up and dries out slowly in the spring. It is strongly acid or medium acid in the surface layer and subsoil and strongly acid through slightly acid in the substratum.

The major limiting factor for community development is the seasonal high water table. Onsite septic systems need special design and installation to prevent effluent from seeping to the surface. Foundation drains help to prevent wet basements. Lawns are wet and soggy in the fall and spring. Quickly establishing a plant cover and using mulch, temporary diversions, and sediment basins help to control erosion during construction.

Sediment and Erosion Controls

Although there was an attempt to formulate a Sediment and Erosion Control plan for this project, it was not adequate. A detailed Sediment and Erosion Control Plan should be developed consisting of the following:

A. A narrative describing:

- 1. the development;
- 2. the schedule for grading and construction activities including:
 - a. start and completion dates;
 - b. sequence of grading and construction activities;
 - sequence for installation and/or application of soil erosion and sediment control measures;
 - d. sequence for final stabilization of the project site;
- 3. the design criteria for proposed soil erosion and sediment control measures and storm water management facilities.
- 4. the construction details for proposed soil erosion and sediment control measures and storm water management facilities.
- 5. the installation and/or application procedures for proposed soil erosion and sediment control measures and storm water management facilities.
- 6. the operations maintenance program for proposed soil erosion and sediment control measures and storm water management facilities.
- B. A site plan map at a sufficient scale to show:
 - 1. the location of the proposed development and adjacent properties;
 - 2. the existing and proposed topography including soil types, wetlands, watercourses and water bodies;
 - 3. the existing structures on the project site, if any;
 - 4. the proposed area alterations including cleared, excavated, filled or graded areas and proposed structures, utilities, roads and, if applicable, new property lines;
 - 5. the location of the design details for all proposed soil erosion and sediment control measures and storm water management facilities;
 - 6. the sequence for grading and construction activities;
 - 7. the sequence for installation and/or application of soil erosion and sediment control measures;

8. the sequence for final stabilization of the development site.

Engineering Concerns

The road and location of the house lots, for the most part, take advantage of the changing slopes so the surface drainage does not accumulate from one lot to the next. The roadways are steep, 10 percent in some spots, with cuts and fills ranging up to 10 to 12 feet. The road drainage seems to be adequate with catch basins each 300 to 400 feet.

Some lots are steep and the driveways into the lot will be steep, as in lot numbers 15, 16, 17 and 18. The three lots 26, 28 and 30 have very steep (20 to 30 percent) and long (400 feet) drives. These drives into lots 26, 28 and 30 should have catch basins along the sides to keep surface waters from eroding the driveways.

The culvert at station 33+0 and 47+50, outlets onto a steep slope and could cause erosion down across lot numbers 15 and 23 or 24. A stable open channel should be provided or continue the culvert to a safe outlet.

From the contours, it appears that a culvert should be provided under the road at station 69+0 or at least show "grade to drain" away from the road.

The surface drainage from lots 51 and 52 drains onto lots 53 and 54. This surface drainage could be diverted along the property line between lots 52 and 53 by use of a diversion.

The Team engineer has not addressed the surface water draining from the lots into the wetlands or the sediment and erosion control measures at individual lots. Some consideration should be given to phases of construction, so that the whole area is not disturbed at one time.

The main channel of Day Meadow Brook runs through the property and at road crossings the culvert sizes need to be carefully designed in order to avoid flooding of properties along the brook.

WATER SUPPLY

Although the Borough of Colchester has a public water system, the proposed development, being in the town and located at a far end of the municipal boundary, will need to be served by onsite wells. As wells for single family houses have a required withdrawal rate of less than 10 gallons per minute (gpm), the minimum separating distance needed from sewage disposal systems or other known potential sources of pollution is at least 75 feet. Wells in general should be of the drilled type and located at or relatively close to the upper portion of lots. Essentially, wells should be placed upgrade of where a sewage system is to be installed. A drilled well with its casing sealed into underlying bedrock will usually affort the highest degree of protection against possible contamination and will usually provide for a sufficient, reliable yield. Because

drilled or "rock" wells rely on cracks or fractures in the underlying bedrock as their water-bearing formation, the most critical locations for wells to avoid possible pollution or contamination, are in areas which have very porous soils or where overlying soils are shallow in regard to bedrock. In both cases, filtration and renovation abilities of soils would be impaired and pollutants could travel greater distances exceeding what would normally be considered as a safe renovating distance. For the particular parcel under consideration, one would have to be more concerned with those areas having rock outcrops and/or shallow bedrock and moderate to steep slopes. Therefore, actual placement of any wells should reflect the geology, topography, soil formations and other factors which may have to be considered such as facilities for or on adjacent lots.

In Connecticut Water Resources Bulletin No. 31, prepared by the U.S. Geological Survey in cooperation with the State DEP, many wells in the lower Connecticut basin, of which the subject parcel is a part, are analyzed in terms of yields and chemical quality. Of those wells studied that tapped metamorphic rock (the type which underlies the site), 90 percent yielded almost 2 gpm or more, 80 percent yielded 3 gpm or more, 50 percent yielded 6 gpm or more, and only 10 percent yielded 18 gpm or more. An average household usually may be adequately served by a yield of 3 gpm, or less is ample storage is provided. Most of the residential lots should, therefore, be able to achieve a sufficient well water supply. There is no way to determine what the yield of a well drilled at any specific point in the parcel would be, since yield depends upon the number and size of water-bearing fractures that are intersected, and since the distribution of fractures in bedrock may be highly irregular.

Although the chemical quality of groundwater in the lower Connecticut River basin has been found to be good, there may be a need for filtration systems on this site due to elevated iron and/or manganese levels. The wells on this site would also need to be protected from the sources of pollution such as onsite sewage disposal systems, road drainage, fuel oil storage tanks, etc.

SEWAGE DISPOSAL

As recent installation of municipal sewer facilities did not extend to the area in question, sewage disposal for the proposed subdivision would need to be attained by onsite septic systems.

Based on visual observations of the topography and consideration of soil service mapping data (apparently test pits have been dug but soils information was not compiled for presentation), the area is mixed as to the suitability for sewage disposal purposes. Areas having a predominance of the Canton-Charlton type of soils should not be limited except possibly where slope tends to be rather steep. In that case, precautions to prevent effluent from seeping to ground surface downgrade from the actual leaching system should be taken. Surface stones and boulders may also impose some difficulty for installation.

Areas having a combination of Charlton and Hollis type soils where underlying bedrock may be shallow (less than 4-5 feet) would be restricted. In those

areas it would be important to have adequate testing to locate and delineate areas of sufficient size for sewage disposal. As bedrock can interfere with the installation and effective operation of septic leaching systems, there must be at least 4 feet of suitable soil between the bottom area of a system and the top of bedrock. This usually means that bedrock would have to be 6-7 feet below ground surface in order to be able to install a system. Where there is less than 4 feet of suitable existing soil over rock, the area would be considered having unsuitable conditions. Where there may be 4 feet of natural soil several feet of additional fill would be needed. On steeply sloping terrain there needs to be consideration for the possibility that sewage effluent may break out downslope from the leaching system. There should be no rock outcroppings within 50 feet downslope of a leaching system. If there are any springs they would need to be at least 75 feet away.

There is also a much more limited area around the watercourses which has soils that are poorly drained and have a high ground water table. Any site encompassing such an area would most likely necessitate extensive filling.

In general, areas having high ground water or shallow bedrock conditions would require the preparation of detailed engineered plans for sewage disposal systems.

While the overall proposed density of the subdivision would not appear to be too great, lot(s) layout and final evaluation should take onsite test results into consideration as well as various restrictive factors that are in evidence. Some adjustment may be needed to assure the feasibility of individual lots within the subdivision.

PLANNING CONCERNS

The property that is the subject of this report is bordered on the north by Hartford Road, and on the south by Route 2, a limited access expressway which connects Norwich with the Hartford area. The lots on the southern edge of the proposed subdivision border on Route 2. Three of the proposed lots are located over the Colchester town line in the town of Marlborough. The lots along the northern side of the subdivision will border on the town of Hebron. This is perhaps the place to note that according to State statutes, before the subdivision is approved by the Colchester Planning and Zoning Commission, it will have to be reviewed by the Capitol Region Council of Governments as well as by the Southeastern Connecticut Regional Planning Agency.

With the exception of Route 2, as noted above, surrounding land uses in the immediate vicinity of the subdivision are rural in nature. However, along Hartford Road in Colchester, immediately to the west of the site, is a strip of residential development which, according to the 1980 areal photographs, contains sixteen houses. Also shown on the same photograph is a similar strip along Kellog Road in Marlborough. This latter road intersects with Hartford Road about one-half mile west of the Marlborough-Colchester border.

The subdivision proposal that is under consideration here seems to be compatible with the above-described surroundings, and seems to be an appropriate use for the site. There is good access to Route 2 for transportation. School, government, and commercial facilities are available in the Borough of Colchester, approximately four miles away.

Nevertheless, the question remains of the appropriate number of houses to be placed on the site. The land is very hilly and stony. Onsite water and sewage disposal systems will be necessary. The limitations that these will place on development of the site are discussed elsewhere in this report. However, some other possible limitations should be considered.

The first question that arises is that of required open space. Section 6.5.1 of the Subdivision Regulations requires that open space be provided on the basis of one acre per twenty lots or fraction thereof. If we assume there will be seventy-five lots, this means there will be a requirement of four acres of open space. It is suggested that this could be used to advantage to protect some of the wetlands areas that lie in the bottom of the central valley on the site.

Section 10.3.1 of the Zoning Regulations require that no building be located closer than fifty feet to a wetland. The Conservation and Inland Wetlands Commission utilizes the same standard. On this basis, at least four of the lots on the preliminary rough layout plan of the subdivision appear to be unworkable. Here the locations of the lot lines should be adjusted or, if necessary, two lots could be combined into one.

In addition, at least three of the large interior lots indicated on the plan have access strips which cross wetlands. These will require a culvert or some similar type of improvement.

The traffic impact of the proposed subdivision is difficult to evaluate because there is no information available on current traffic levels along Hartford Road. The best guides to the situation are the 1982 Average Daily Traffic (ADT) figures provided by the Connecticut Department of Transportation* for Route 149. South of Route 2 the 1982 ADT on that highway was 1,700 vehicles per day and between Route 2 and Hartford Road, it was 1,100 vehicles per day. It seems unlikely that traffic on Hartford Road is greater than that on the latter section of Route 149. Also, the capacity of the road in vehicles per hour will not be very different from that of Route 149. It can be assumed, based on Department of Transportation data, that maximum hourly traffic volume is 12% of the ADT. Thus, on this section of Route 149, maximum traffic can be estimated to be 12% of 1,100 vehicles, or 132 vehicles per hour. Maximum capacity on such a road is given by CONNDOT at 500 vehicles per lane, per hour, or in this case, 1,000 vehicles per hour.

The report entitled <u>Trip Generation</u>, 3rd Edition, published by the Institute of Traffic Engineers states that during the afternoon peak hour, around 5:00 PM, a residential subdivision generates one trip per residential unit. This means, in the case of the subdivision under consideration, which is planned

^{*}Traffic Log of State Numbered Routes and Roads, 1982. Connecticut Department of Transportation.

for seventy-five houses, that about seventy-five trips will take place during this hour. Thus, while the percentage increase in traffic on Hartford Road could be large, there should be more than adequate capacity in the road to absorb the increase.

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 activitis. 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 (774-1253), Environmental Review Team Coordinator, Eastern Connecticut RC&D Area, P.O. Box 198, Brooklyn, Connecticut 06234.