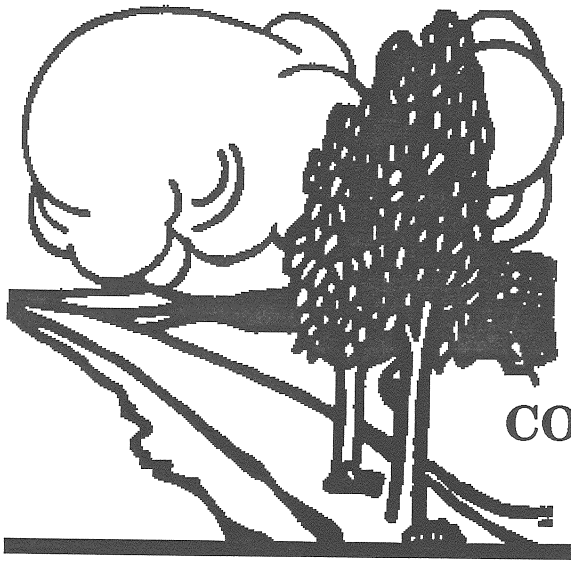


# PIERPONT PLAZA

**COLCHESTER, CONNECTICUT**

**JANUARY 1991**

# *Eastern Connecticut Environmental Review Team Report*

**Eastern Connecticut**
**Resource Conservation and Development Area, Inc.**

# PIERPONT PLAZA

## COLCHESTER, CONNECTICUT

**Review Date: November 20, 1990**

**Report Date: January 1991**

## EASTERN CONNECTICUT ENVIRONMENTAL REVIEW TEAM


**Eastern Connecticut**
**Resource Conservation and Development Area, Inc.**

**P.O. Box 70**
**1066 Saybrook Road**
**Haddam, CT 06438**

**203-345-3977**

ENVIRONMENTAL REVIEW TEAM REPORT
ON

# PIERPONT PLAZA SHOPPING CENTER
# COLCHESTER, CONNECTICUT

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

The ERT met and field checked the site on Tuesday, November 20, 1990. Team members participating on this review included:

| | |
|---|---|
| ■ **Nick Bellantoni** | **State Archaeologist**<br>**Office of State Archaeologist** |
| ■ **Mark Edmonds** | **District Conservationist**<br>**USDA - Soil Conservation Service** |
| ■ **Carla Guerra** | **Environmental Analyst**<br>**DEP - Inland Water Resources Division** |
| ■ **Dawn McKay** | **Zoologist**<br>**DEP-NRC, Natural Diversity Data Base** |
| ■ **Brian Murphy** | **Fisheries Biologist**<br>**DEP - Eastern District Headquarters** |
| ■ **Dave Poirier** | **Staff Archaeologist**<br>**Connecticut Historical Commission** |
| ■ **Richard Serra** | **Regional Planner**<br>**Southeastern CT Regional Planning Agency** |
| ■ **Elaine Sych** | **ERT Coordinator**<br>**Eastern Connecticut RC&D Area, Inc.** |
| ■ **Bill Warzecha** | **Geologist/Hydrologist**<br>**DEP - Natural Resources Center** |

Prior to the review day, each Team member received a summary of the proposed project, a list of the town's concerns, a location map, a topographic map,

and a soils map. During the field review the Team members were given plans, a drainage study, a hydrogeologic study, a letter from the CT State Department of Health, a study by Goldberg-Zoino & Associates and a wetland assessment. The Team met with, and were accompanied by the Colchester Town Engineer, the Colchester Wetlands Agent and a representative from the Colchester Utilities Commission along with the developer and his engineer and attorney, as well as a concerned citizen and his attorney. Following the review, reports from each Team member were submitted to the ERT Coordinator for compilation and editing into this final report.

This report represents the Team's findings. It is not meant to compete with private consultants by providing site designs or detailed solutions to development problems. The Team does not recommend what final action should be taken on a proposed project -- all final decisions rest with the Town and landowner. This report identifies the existing resource base and evaluates its significance to the proposed development, and also suggests considerations that should be of concern to the developer and the Town. The results of this Team action are oriented toward the development of better environmental quality and the long-term economics of land use.

The Eastern Connecticut RC&D Executive Council hopes you will find this report of value and assistance in making your decisions on this proposed shopping center.

If you require additional information, please contact:

Elaine A. Sych
ERT Coordinator
Eastern Connecticut RC&D Area
P.O. Box 70
Haddam, Connecticut 06438
(203)345-3977

# TABLE OF CONTENTS



# TABLE OF MAPS

# 1. LOCATION, LAND USE AND ZONING

The site, 10.9 acres in size, is located southwest of Colchester center along Linwood Avenue (Route 16). It is bounded by Linwood Avenue (Route 16) on the northwest, which provides access to the site, a municipal sanitary sewer line right-of-way on the south, undeveloped land on the east and residential/commercial properties that front Hartford Road (Route 85) on the north. The latter area comprises the central business district for Colchester. In the vicinity of the site, land uses are mixed and include commercial/office space, medium to high density residential and undeveloped land. Route 2 occurs less than 1,000 feet south of the site. As mentioned above, a sanitary sewer line traverses the southern limits of the parcel.

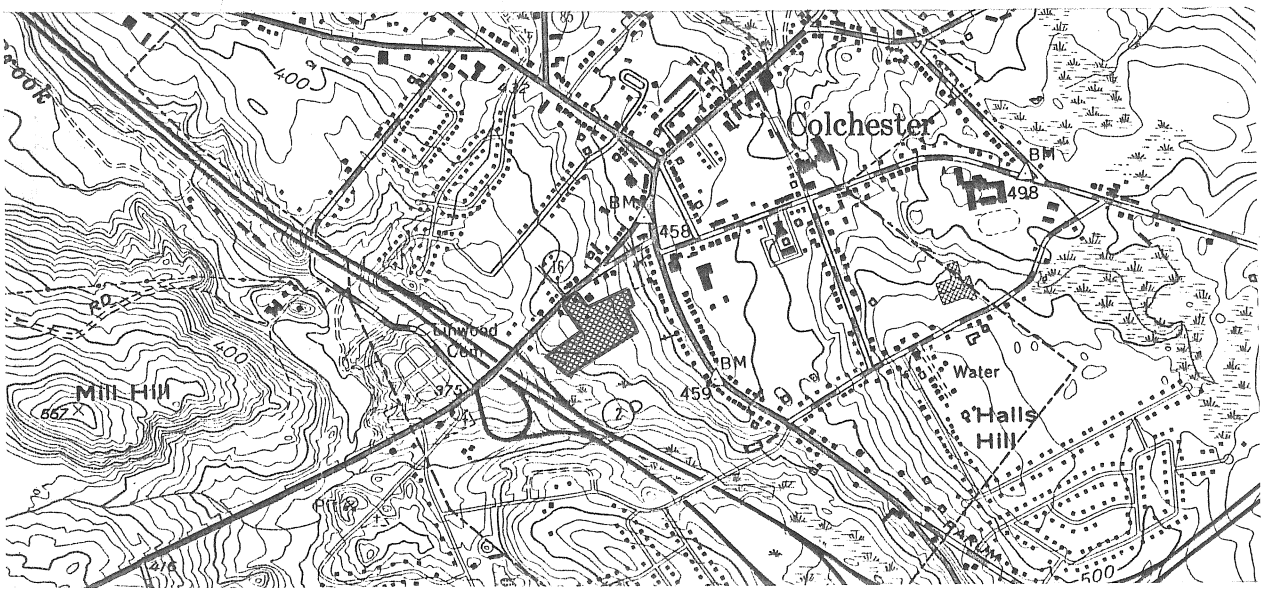
A review of air photos that included the site and vicinity and that date back to 1965 indicate that the site consisted of farm fields and pasture land which is now becoming overgrown with small trees and brush. Due to past site grading/excavation in central and eastern parts, the water table is at or near the ground surface throughout this area.

The site is located in a GC (General Commercial) Zone.

## LOCATION MAP

Scale 1" = 2000'

Approximate Site



# 2. TOPOGRAPHY

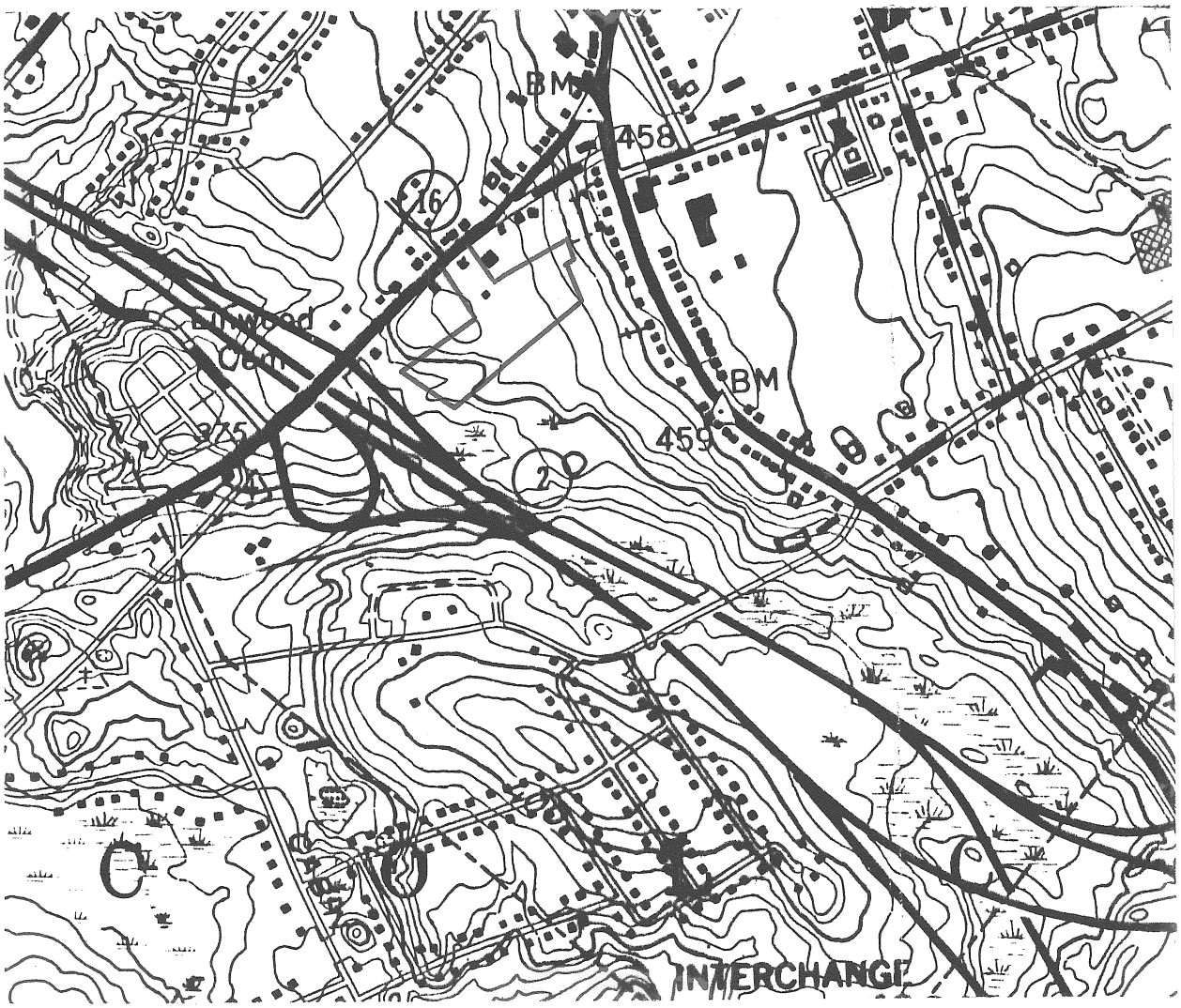
The site is located northwest of Halls Hill in central Colchester. In general, the land surface slopes gently to moderately to the southwest. Site elevations range from a low of about 380 feet above mean sea level at the southern limits to a high of about 450 feet above mean sea level at the northern limits.

Under present plans, a nearly 10 foot cut will occur at the site's northern limits and substantial filling will take place in the southern parts in order to develop the site for the proposed shopping center. (Also see **GEOLOGY** section)

## TOPOGRAPHIC MAP

Scale 1" = 1000'

—— Approximate Site Boundary



# 3. PROJECT DESCRIPTION

The proposed development consists of a retail shopping center. Specifically, the development includes the construction of a 39,850 square foot supermarket, 49,100 square feet of various specialty shops and 3,500 square foot bank. The latter building is separate from the main retail building and is located near the entrance to the proposed shopping center. The paved parking lot and entrance road serving the proposed shopping center will nearly cover the remainder of the site. In order to create a nearly level site, cutting and filling will be required for the development. As a result, nearly all of the regulated wetlands on the site, about 2 acres, as identified by the applicant's soil scientist would be functionally removed from the ecosystem by the proposed shopping center.

The development would be served by public sewers tied into the Colchester municipal system. Team members were informed on the review day that an existing moratorium on the town's public water supply system prohibits the proposed shopping center from tying into the system until the spring of 1991. As such, the applicant is considering, as an interim water supply source for the shopping center, a drilled well that's cased into the underlying bedrock. Team members were informed that a prospective well location is in the northeast corner of the site. (See also **WATER SUPPLY** section)

# 4. GEOLOGY

A bedrock geologic map (QR-27, by L.W. Lundgren and G.L. Snyder) for the Colchester topographic quadrangle, which encompasses the site has been published by the Connecticut Geological and Natural History Survey. No surficial geologic map exists for the quadrangle to date. Therefore, the Team's geologist utilized the Soil Survey for New London County, Connecticut as well as unpublished surficial geologic mapping data on file at the Department of Environmental Protection's Natural Resources Center in Hartford. In addition, subsurface data for the site which was collected and interpreted by GZA Associates, Inc. was distributed to Team members. This work included ten (10) deep test holes throughout the site which advanced between 6 feet and 11 feet below ground surface. Bedrock or refusal was not encountered. However, due to increased boulder contact with depth in survey test holes and bedrock exposures observed near the site's southern border (along the north side of exit ramp 18 off Route 2), it probably does not exceed much more than 10 feet in most places.

Map QR-27 identifies the bedrock underlying the site as Brimfield Schist, a gray, rusty-weathering, medium to coarse grained, interlayered schist and gneiss. The terms "schist" and "gneiss" refer to the textural and structural aspects of the rock. Both are metamorphic rocks which means they have undergone changes due to high pressures and temperatures in the earth's crust. These changes generally include recrystallization, altered mineral composition and alignment of elongated minerals and platy minerals. In gneisses, thin layers of elongate minerals alternate with layers of more rounded minerals giving the rock a banded or streaked appearance. In schists, there is a larger percentage of platy minerals (micas) which give the rock a slabby appearance. Often, layers of schist and layers of gneiss may be found intermixed in a rock outcrop.

The bedrock geology of the site should not have a direct impact on the development unless it is encountered in "cut" areas in which case blasting may be required or if it is used for a temporary water supply source for the shopping center. In terms of supplying groundwater to well(s), schists have a tendency to be less productive than other types of bedrock in Connecticut, and they are also more likely to produce ground water with undesirably high concentrations of iron, manganese, or sulphide. The presence of these mineral constituents

commonly makes the water aesthetically unacceptable and generally requires filtration. Hardness may also be a problem in some cases.

Because the bedrock is commonly weathered in the top few feet, it may yield easily to a large backhoe if it is encountered. This can help to reduce the chance for environmental impacts due to blasting; i.e., seismic shock, airblast and flyrock.

The exact depth to bedrock is unknown but it probably does not exceed much more than 10 feet in most places on the site. A boring in the middle of Route 2 southwest of the site advanced through 15 feet of unconsolidated materials before reaching bedrock/refusal. Additional testing in the "cut" area (northern parts) and in the area of proposed buildings is warranted.

Except for along the southern property line, the site is covered by till. Till is a glacial sediment that was deposited directly from an ice sheet. Because the ice, as it moved forward through the region, indiscriminately collected and transported rock particles and fragments of widely ranging sizes, the till is a non-sorted mixture of clay, silt, gravel and boulders. The texture of the till is also variable ranging from sandy and loose to silty and tightly compact. Soil mapping data indicates that the variety of till which covers the site is characterized by a silty compact soil at a relatively shallow depth (generally about 2 feet below the surface). On the other hand, deep test hole data reported by GZA, Inc. indicates that the texture of the till is sandy/gravelly.

The compact nature of the till covering the site would ordinarily be a potentially severe limitation for on-site sewage disposal systems due to a seasonally high water table condition and slow permeabilities in the compact soil zone. However, due to the anticipated use of municipal sewers, the soils should not pose any unusual constraints.

Other potential engineering concerns with "hardpan" soils focus on the possibility for wet basements and difficulty in stabilizing deep "cut" areas. If buildings are constructed with basements, building footing drains should be installed around the perimeter of the foundation. This will hopefully help prevent wet basements. Also, buildings could be constructed with slabs on grade. Deep cuts or excavations in hardpan soils, such as the one proposed at the northern limits, are extremely difficult to stabilize due to the seepage of groundwater over

the restrictive layer approximately 1.5-2.5 feet below ground surface. This water may create an unstable condition just below the seepage line. The weight of the unstable soil causes the soil to flow downslope. Once this begins, the slope is very difficult to stabilize. The establishment of a good vegetative cover is practically impossible on these eroding slopes. Besides the unsightly condition, the eroded soil must be removed from the base of the slope. Soil slopes usually cannot exceed 2:1 (horizontal:vertical).

Due to the proximity of the car dealership northeast of the proposed "cut", it is strongly suggested that an exact determination be made whether or not the building's sanitary facilities and floor drains are tied into the municipal sewer line. The concern here is that partially treated septic tank effluent or other liquid wastes may break out at the "cut" embankment and cause a public health hazard condition on or off-site. A minimum setback of 75 feet should be maintained from any part of a "cut" area and all on-site sewage disposal system(s). Also, there is a concern that storm drainage for the shopping center may intercept partially treated or contaminated effluent from a septic system and route it directly to a downstream area. Every effort must be made to protect the municipal well field located ±1,000 feet southwest of the site (down gradient).

Overlying till in the southern parts of the site are stratified drift deposits. Sand and gravel are its major components. These glacial deposits often have high permeabilities. Additionally, thick (usually 40 feet or more) saturated deposits of stratified drift may have potential for individual, community or public well water supplies. The exact thickness of this stratified drift in the site is unknown but it is probably 10 feet or less. The town's municipal water supply wells mentioned in the preceding paragraph are hydraulically connected to the same stratified drift aquifer.

It should be noted that the Soil Survey for New London County identifies soils derived from sand and gravel deposits over the majority of the site except along its northern border. As such, it varies from the unpublished surficial geologic mapping data. Detailed testing would need to be conducted in order to establish the exact stratified drift/till contact. For the purposes of this report, the Team's geologist will utilize the contact adapted from the unpublished surficial geologic map.

According to present plans, regulated inland-wetland areas bisect the

southern parts of the site. They also occur in two areas in the northcentral parts. The wetland soils were identified in the field by a certified soil scientist, and their boundaries were superimposed onto the site plan. The Team's geologist estimated the surface area of the mapped wetlands with a computerized planimeter to be about 2 acres or about 18% of the site. Although a detailed description of the wetland soils were not made available to Team members, it appears that they are poorly to very poorly drained soils that occur in drainageways and depressions or glacial uplands. Slopes are flat to gentle. The water table is at or near the surface during winter and spring. The presence of a relatively shallow compact soil zone impedes the downward movement of water. The major obstacles of these soils are the presence of seasonally high water tables and a compact layer 1.5 feet below ground surface.

Present plans indicate that buildings and parking lots will be constructed over almost all of the wetland soils (±2 acres) mapped on the site. The presence of seasonally high water tables in these areas is an engineering concern in terms of the building and parking lot construction. It they are constructed on these soils, a geotechnical engineer should investigate the potential of these soils to support buildings. Soil testing in the wetland areas is warranted to determine soil textures, composition, depth to the water table and to determine the loading rate of the soil. If buildings are permitted on the wetland soils, all foundations should have both exterior footing drains and an interior underdrain system. Water stops should be placed between walls and footings. Instead of basements, buildings could be constructed with slabs on grade. Even with the potential engineering measures mentioned, the construction of buildings on wetland soils should be discouraged.

The destruction of a wetland due to grading and filling will take away any of the natural hydrological or ecological functions that it may be presently performing in the drainage area. Wetlands are known to provide water quality benefits by filtering sediment, chemical absorption and chemical decomposition. Because of the position of the site's wetlands with respect to an urbanized area on the northeast and the town's well field on the southeast, it seems likely that it serves at least some important hydrologic functions in terms of treating natural surface runoff from an urban area.

All wetland impacts require a permit and ultimate approval by the town's Inland Wetland Commission. In reviewing the proposal, Commission members

must determine the impact that the proposed activity will have on the wetlands. If Commission members find that the wetland is serving an important hydrological or ecological function and that the impact of the proposed activity will be significant, they may deny the activity altogether, or at least require measures that would minimize the impact. All prudent and feasible alternatives should be carefully investigated and considered by the applicant and the Town. A new shopping center constructed over ±2 acres of wetlands will require a permit from the U.S. Army Corps of Engineers because more than one acre of wetlands would require filling in order to construct the shopping center. The town should advise the applicant's technical consultant to contact the Army Corps of Engineers.

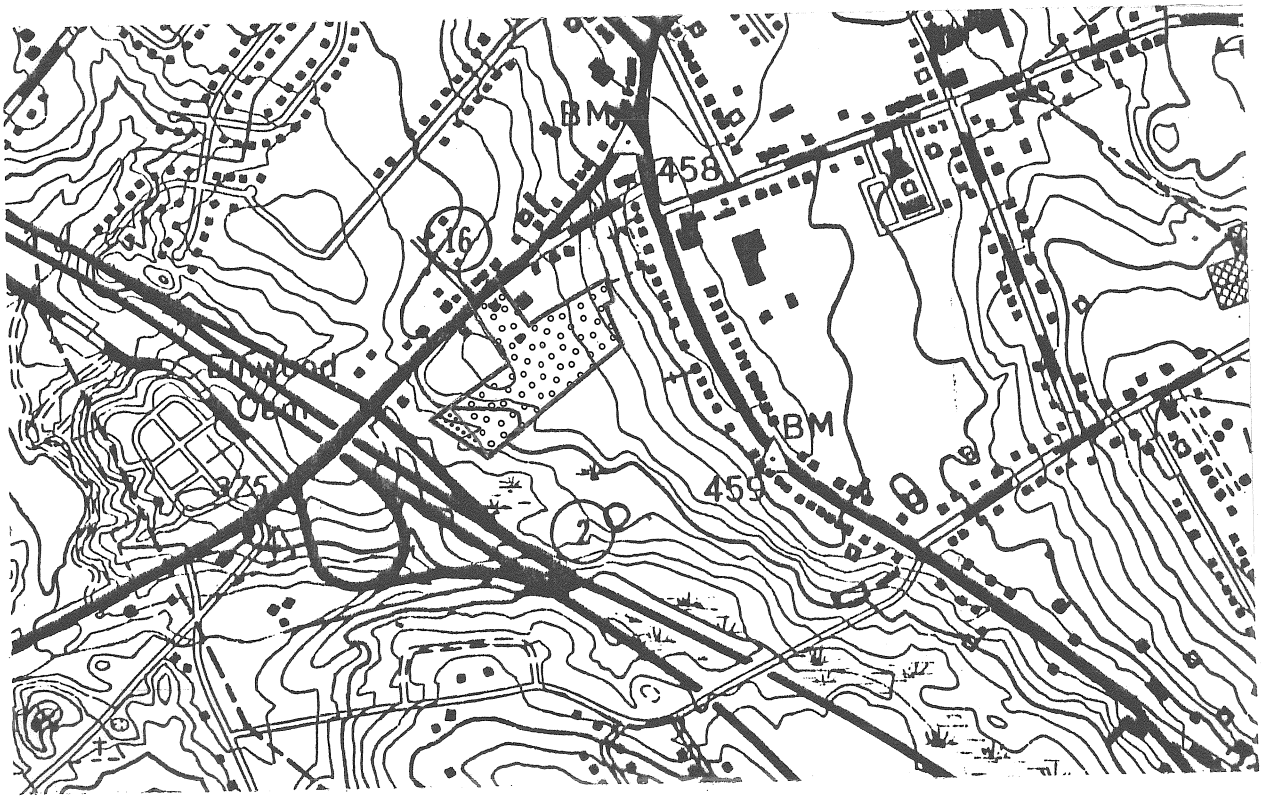
## GEOLOGIC MAP

Scale 1" = 1000'

Entire site underlain by Brimfield Schist

Till
Stratified Drift

(Till/stratified drift boundaries adapted from Surficial Materials Map of Connecticut, 1985, J. Stone, et. al., unpublished)



# 5. SOIL RESOURCES

The proposed development of the shopping center is on an area of transition between outwash soils and till soils. The eastern portion is mapped as Paxton and Montauk fine sandy loam (PbB), and the west side is mapped as Hinckley gravelly sandy loam (HkC). There are about 1.5 acres of wetland soils which have been located by a soil scientist. The major concerns have been regarding the impact of the proposed plaza on the wetlands and the near-by public water supply wells.

The latest proposal indicates that all wetland areas will be filled, thus destroying all values of the wetlands. A major function of these wetland areas appears to be filtering and storage of runoff. Even if these functions are artificially created with control structures this would not, of course, replace the wildlife habitat and open space values of these wetland and adjacent areas.

The gravelly soils are susceptible to leaching of contaminants into the ground water. Because of this, especially in close proximity to the public water supply wells, infiltration of the storm water runoff from the proposed shopping center is not desirable. There has already been contamination from salts and petroleum in some of the wells. Keeping the runoff on the surface (piping to existing streams) would reduce the likelihood of such contamination. The engineer has indicated that storm water retention will be installed to prevent peak flows from becoming damaging downstream. Sediment and chemical traps in the storm water management system may provide the filtering that is now provided by the wetlands. These traps will only be effective if they are maintained properly.

The following are comments regarding the erosion and sediment control plan.

- The schedule of grading and construction activities should be included with updated dates.

- The design criteria for the sediment basin should be included for town engineers review. Design should be in accordance with the Connecticut Guidelines for Erosion and Sediment (E&S) Control.

■ Include construction and installation details for E&S control measures.

■ Include the name of the person who will be responsible for installation and maintenance of the E&S control measures.

■ Include organization or person who will be responsible for maintenance of permanent measures when the project has been completed.

■ If local zoning requires setbacks they should be shown on the plans.

■ The location of the proposed well should be shown.

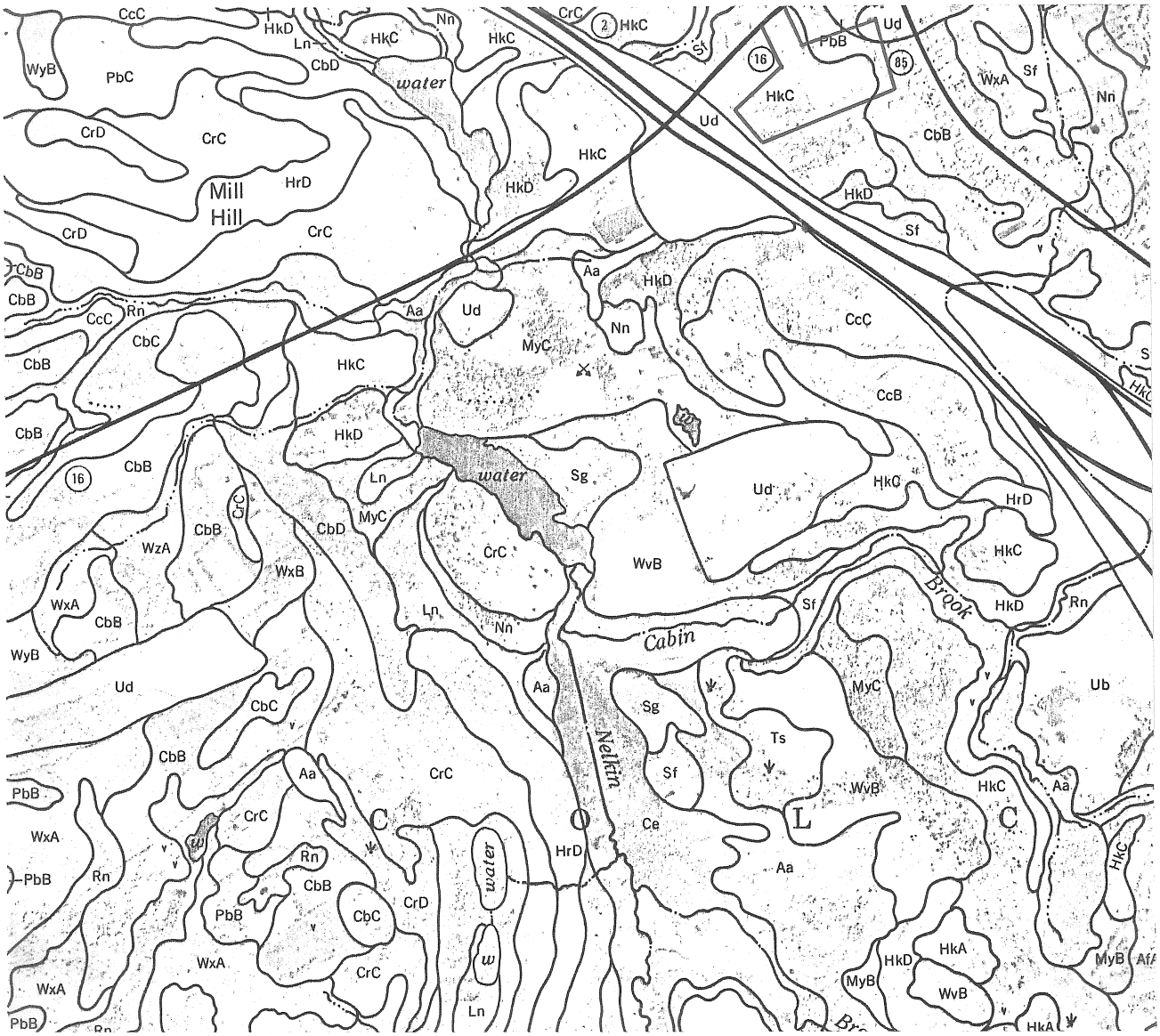
■ The location of stockpiled topsoil and the disposal procedure for woody vegetation should be included in the plan.

As previous reports have indicated, sand only should be used on the parking lot to eliminate the threat of salt contamination. Will sand only provide acceptable control of ice and snow? (please see **FISH RESOURCES** section)

In summary, some of the wetland values can be replaced with control structures, and measures can be taken to reduce the potential for contamination of the water supply. However, if the project is completed, some wetland values will be lost forever and there will be an additional potential source of contaminants for the public water supply wells. With the public water supply so close and contamination problems already in existence, the first concern should be to protect that resource. Before permitting the construction of the proposed plaza, it seems prudent that the town consider any and all alternatives before jeopardizing the water supply. The town should weigh the costs and potential costs against the benefits derived from the project.

# SOILS MAP

Scale 1" = 1320'



# 6. HYDROLOGY

The site lies entirely within the Cabin Brook/Nelkin Brook drainage area. Surface runoff on the site flows in a southwesterly direction towards Route 2, where man-made structures such as culverts, paved and grassed swales and pipes route the water to an unnamed tributary to Cabin Brook/Nelkin Brook. Groundwater flow on the site probably mimics surface water flow to a large degree. The towns well field, which taps the stratified drift aquifer associated with Cabin Brook/Nelkin Brook is located about 1,000 feet southwest of the site.

Surface water on the site has not been classified by the Department of Environmental Protection (DEP) Water Compliance Unit, but is presumed to coincide with existing groundwater classifications. As such, except for the northeast parts of the site, which would be class "A" surface water, the majority of the site is "B/A". Class "B/A" water resources are known or inferred to be degraded in water quality and are generally suitable for recreational, agricultural or certain industrial uses such as process or cooling water. The State's goal is to improve, through best management practices, water quality to that of a Class "A" water resource. Class "A" water resources are suitable for drinking water, recreational or other uses and may be subject to absolute restriction on discharges, although certain discharges may be allowed.

The proposed shopping center will greatly change the hydrology of the site. Because of the amount grading and filling required for site preparation, the amount of impermeable surfaces to be created and the drainage directing measures to be employed, the character of the site and vicinity drainage will be altered markedly. For example, Team members were informed approximately 8 acres of drainage area, located in the northeast parts of the site will be diverted via man-made structures to Kmick Lane to the west.

The main concern with regard to increased runoff from the shopping center site which can lead to off-site problems include flooding, erosion and water quality degradation. By changing land cover on the site, there can be reduced infiltration into the soil, decreased interception of precipitation by vegetation, and changes in the timing of runoff. Large, uncontrolled volumes of runoff from the site can cause flooding and erosion if not properly controlled and conveyed from the site. In addition, pollutants such as sediment (silt and fine sands), oil,

grease, nutrients, metals and other automobile residues can be washed off of the paved parking areas and rooftops during storm events and be transported to downstream areas thereby posing a water quality threat to local water resources.

Because of the site's proximity to the town's well field, the quality and quantity of stormwater runoff that reaches surface and ground water during and after development on the site should not be altered from pre-development conditions. This should be the main focus of the stormwater management plan.

There are several types of structural and non-structural measures that can and should be used to control and alleviate the adverse impacts of stormwater runoff. Examples of such measures include detention basins, infiltration basins, filter strips, grassed swales and other vegetative measures including using existing wetlands. The latter should only be considered if the adverse impacts to the wetland can be avoided. Direct, untreated discharges may overload the natural system, and make it impractical to manage resulting in contamination of the wetland. Natural wetlands should be used only for final polishing after pre-treatment by infiltration basins, oil/grit separators, and other structural/non-structural measures. Priority should be given to maintaining natural drainage systems, including streamcourses, swales and drainage ditches in an opened condition. When this cannot be accomplished, justification should be made as to why it is necessary to have a closed system.

Team members were informed on the review day that post-development runoff from the site would be handled in underground pre-cast storage galleries/leaching pits. Although this may be desirable in terms of groundwater recharge, concerns that runoff laden with spilled hydrocarbons, automobile residues, and deicing compounds pose too great a threat to local groundwater quality especially the town's municipal well field. Also, from a flooding standpoint there is concern whether or not the subsurface detention structures can handle post-development peak flows from the larger storm events, i.e., greater than the 10-year storm event. As a result, consideration should be given to a surface stormwater management system.

Utilizing the existing wetlands on the site may be possible provided that stormwater runoff from the shopping center site is pre-treated before it discharges to the wetlands. Control of the "first flush" from the proposed shopping center is important in stormwater management since most runoff

related water quality contaminants are transported from impervious surfaces during the initial stages of a storm event. A disproportionately large load of pollutants generally occurs during the early parts of storms due to the rapid runoff or accumulated pollutants. The installation of oil/grit separators, catch basins equipped with hooded outlets and sumps for trapping sediments and floatables should be considered for pre-treatment of stormwater before it is discharged to the wetlands on the site. Utilizing the site's wetlands for stormwater management will likely require that the proposed shopping center be downscaled significantly. Extreme caution should be exercised with regard to the use of de-icing compounds on the proposed parking lot because of its proximity to the town's well field.

Responsibility for the maintenance of the stormwater management system should be assigned to ensure that ground and surface water is not altered following the proposed development. Because of the proximity of the site to the town's well field and because surface runoff may be adversely impacted by the proposed development, it may be wise to consider a ground and surface water monitoring programs. This could be coordinated with the town. Also, no underground fuel tanks should be permitted on the site.

It is suggested that the town contact the Department of Environmental Protection Aquifer Protection Section at 566-7049 for further assistance regarding ways to protect the town's well field from the proposed shopping center development.

In order to minimize the potential for flooding to downstream areas, stormwater runoff from the shopping center should not exceed pre-development (natural) conditions. To achieve this, stormwater runoff from the site should be controlled so that during and after development, the site will generate no greater peak than prior to development for a 2-year, 10-year, 25-year and 100-year 24-hour storm considered individually.

Present plans indicate that some of the stormwater emanating from the site will be directed to Kmick Lane on the west. All necessary improvements to existing drainage in this area will be required to ensure that stream channel erosion problems do not occur and that the existing and proposed storm drain system is adequate to handle post-development peak flows.

Because of the high percentage of paved parking lot and building roof top areas, which can store large quantities of heat during the summer, heat from such surfaces may be released to stormwater through conduction during storm events. The concern here is that cold water fisheries (trout) may be adversely impacted by runoff with elevated temperatures. Shade trees around the perimeter of detention facilities and/or utilizing water tight subsurface structures to cool stormwater prior to discharge to watercourses are possible mitigative measures to consider for this potential problem. (also refer to **FISH RESOURCES** section).

Due to site conditions (e.g. moderate slopes, till soils, etc., the amount of land disturbance anticipated and the proposed land-use), the potential to degrade surface water on- and off-site during and after development is high. Therefore, it is imperative that erosion and sediment (E&S) control measures be properly installed and maintained, if the shopping center is constructed. Town officials must police E&S control measures on a regular basis. E&S controls should be left in place until each phase of construction is stabilized through one growing season. A detailed E&S control plan that is properly enforced will help reduce the potential adverse impacts to water resources on- and off-site. Every effort should be made to protect Lincoln Lake and all other downstream water resources.

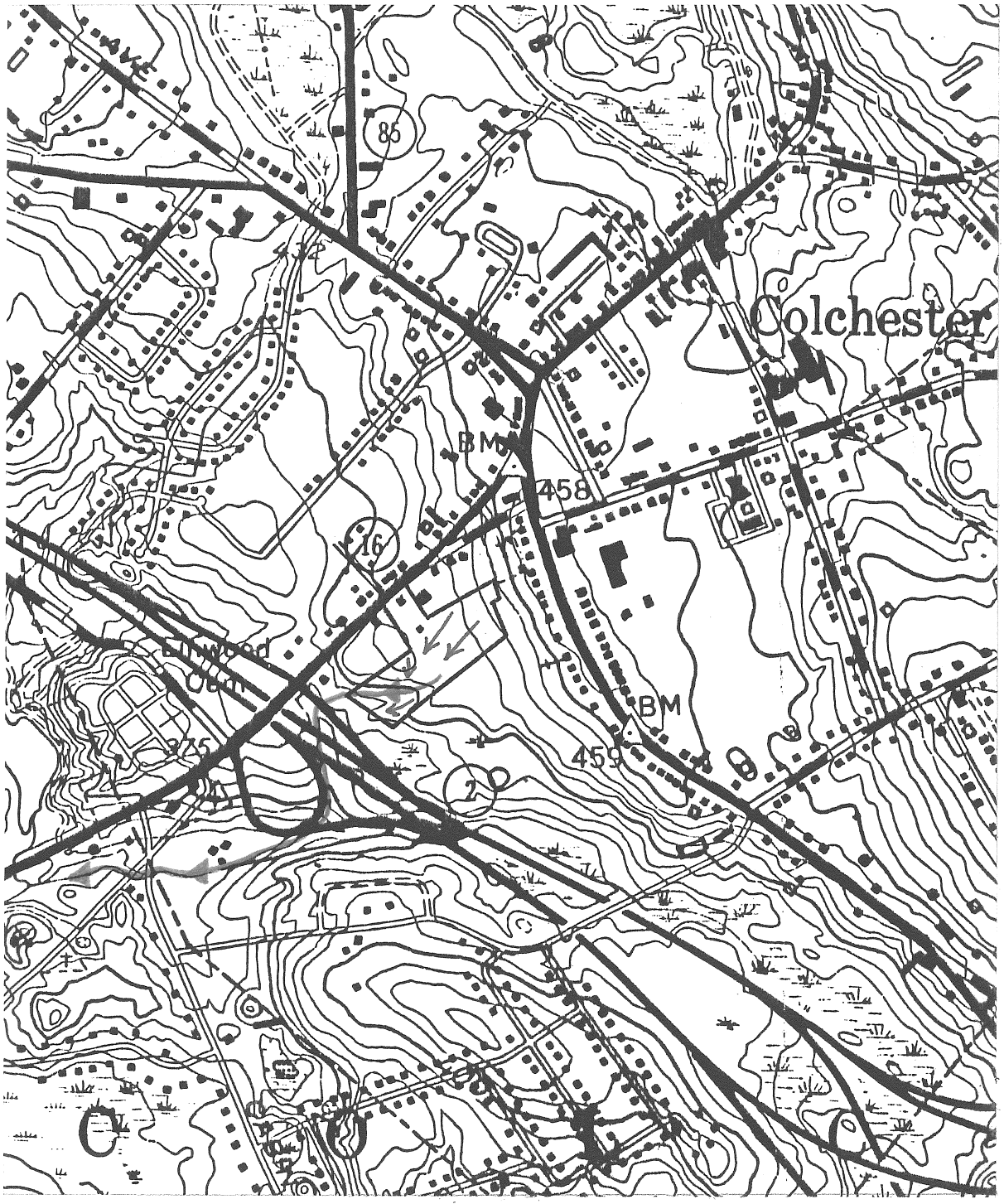
During the construction periods control measures, including silt fences, haybales, temporary/permanent sediment basins which permit settling time for suspended solids, anti-tracking devices and minimizing land disturbance, should be used to minimize environmental damage to on- and off-site wetlands and watercourses. The Connecticut Guidelines for Soil Erosion and Sediment Control (1985, as amended) should be closely followed with respect to the E&S control plan.

# HYDROLOGIC MAP

Scale 1" = 1000'

Direction of Surface Flow

Watercourses showing Direction of Flow



# 7. WETLAND RESOURCE REVIEW

A site inspection was conducted on December 5, 1990. The following comments are offered with respect to wetland/watercourse resources on the site.

The property in question is located on the southeast side of Route 16 in Colchester, CT. Route 2 borders the west side of the property. Proposed in this location is the construction of a shopping plaza with associated paved parking, entrance roads and driveways. This project involves filling 1.55 acres of wetlands, the total area of wetlands on the site.

Historically, the property was used for agricultural purposes with some of the area still existing as abandoned field. Most of the wetland areas on this site have been heavily disturbed by filling, dumping and land clearing activities. The flagged wetlands located adjacent to the Schuster building are drainage ditches serving primarily to direct surface runoff. The habitat value of this wetland area is small considering their disturbed nature and close proximity to development.

The wetlands located in the vicinity of flag numbers 23A to 71A are of somewhat higher quality. This wetland area is characterized by dense shrub/wet meadow vegetation and contains standing water much of the time. While this area has also been disturbed, it provides a higher quality habitat than the wetland area previously discussed. Song birds, small mammals and some amphibian species may utilize this wetland for feeding, shelter and reproductive purposes.

The wetland corridor associated with an intermittent stream extends from the central portion of the property to the far west border, near Route 2. A large portion of this wetland contains a red maple swamp which is the highest quality wetland habitat on the property. While small in size, this wetland does serve deer and other smaller mammals.

While the wetlands on this site are limited in their wildlife habitat values, they do serve other important functions. Probably the most important are the pollution attenuation and sediment filtration functions that are associated with these wetlands. Considerable upland drainage is directed to this site. The wetlands serve to filter qualities of road salt, sediment, and other development pollutants from upland runoff prior to water exiting the site and ultimately

entering public water supplies. With the introduction of additional impervious surfaces, this water quality renovation function becomes increasingly important.

The current development plan involves the complete destruction of the entire area of wetlands on the property, without compensation for the wetlands lost. It is suggested that the applicant evaluate alternatives to this proposal that would either reduce the impact to the wetlands or provide for compensation of the functions they provide. In reviewing applications for significant wetland alteration, Section 22a-41(b) of the Connecticut General Statutes requires that "a permit shall not be issued unless the commission finds that a feasible and prudent alternative does not exist." The applicant should be directed to investigate any and all alternatives to the current plan and be prepared to defend his plan as the most feasible and prudent. Such alternatives may include, but are not limited to: **1)** reducing the scope of the project to allow for maintenance of existing wetlands on the westerly portion of the site; **2)** compensation for unavoidable wetland loss in the form of wetland creation and/or restoration in an attempt to preserve existing wetland functions. The applicant should also be directed to seek permit need determination from the U.S. Army Corps of Engineers.

# 8. WATER SUPPLY

Although public water supply mains are accessible to the site, Team members were informed by Town officials on the review day that a moratorium on new hook-ups prevents the proposed shopping center from tying into the system at the present time. Team members were informed, however, that the moratorium will be lifted in the spring of 1991.

For the interim, the applicant wishes to drill an on-site well or wells to serve the proposed shopping center. The underlying bedrock aquifer appears to be the most suitable on-site water supply source to serve the shopping center. Because of its low hydraulic conductivity, the till covering the site would have low potential for groundwater development. Additionally, the water table fluctuates significantly in the till, making it unreliable as a water supply source, especially during droughty periods or summer months. The sand and gravel deposits that cover the southern parts are probably too thin and not of sufficient aerial extent for groundwater development.

As mentioned above, the most dependable aquifer found on the site, which is suitable for water supply purposes, is the underlying bedrock (schist and gneiss). The crystalline, metamorphic rock underlying the site responds to geologic forces such as faulting, folding and uplift by fracturing and forming seams, fractures and cracks in the rock. The solid part of the rock underlying the site is impermeable for the most part. Water that saturates the cracks, seams or fractures in the rock provides a potential water supply for drilled wells that intersect these openings. In general the fractures, seams or cracks are found in the upper 200-300 feet of the bedrock surface. Gneissic rock responds to tectonic stresses within the earth's crust by fracturing and forming district open joints. Conversely, schists responds to tectonic stress by slipping and folding along foliation planes. The joints that develop in schist are likely to be small and continuous. As such, schist zones tend to be less productive than the gneissic zones in terms of yielding water to a well or wells.

The random nature of the fractures and seams prevents prediction of well yields in bedrock except on a statistical basis. For this reason, it is extremely difficult to predict the yield of a bedrock well prior to drilling. Water Resources

Bulletin No. 31 (Lower Connecticut River Basin) indicates that of 314 wells surveyed in the region that tapped a rock type similar to the type underlying the site, 90% yielded almost 2 gallons per minute, 60% Yielded 5 gallons per minute or more and 10% yielded about 18.5 gallons per minute or more.

Based on a 92,450 square foot retail shopping center, the water demand for the development is estimated to be about 9,245 gallons per day. The latter figure is based on .1 gallons per square foot of gross area for the retail shopping center which was adapted from the Connecticut Department of Health Service's Technical Standards for Subsurface Sewage Disposal System publication.

If the water demand for the project is estimated to be about 9,245 gallons per day, a well pumping about 9 gallons per minute (an 18-hour pumping period) would be required to serve the shopping center. According to Water Resources Bulletin No. 31 only 30% of 314 wells surveyed yielded 9 gallons per minute or more. Therefore, it is likely that more than a single well may be necessary to adequately meet the water demands of the project. Once the water budget for the proposed development is known and other hydrogeologic investigations of the bedrock are made the applicant will be able to determine whether or not the bedrock can provide an adequate amount of water to the shopping center.

The development of an interim on-site well or wells for the shopping center requires approval by the State Department of Health Services (Public Water Supply Section) and the Department of Public Utilities Control. Information on projected needs of the development for water quantity, water quality testing and plans for pumpage, storage, treatment (if necessary) and the distribution system will be necessary for this type of water supply.

According to the Department of Environmental Protection's (DEP) Water Quality Classification Map of Connecticut (Murphy, 1987) groundwater beneath most of the site is classified as GB/GA, which means ground waters are presently contaminated (GB) and the state has established a class "GA" goal. A "GA" water classification means groundwaters are within the area of influence of private and potential public water supply wells and is presumed suitable for direct human consumption. The northeast corner of the site, which according to the applicant's engineer is a potential well site location is classified as GA.

The natural quality of groundwater extracted from the underlying bedrock

is expected to be generally good, although it is known to produce water with undesirably high concentrations of iron, manganese, or sulfide which would lower its overall quality. Additionally, because of the site's proximity to an urban area and because groundwater flows towards the prospective well site, there is a concern that groundwater quality may have been adversely impacted. For these reasons as well as the administrative recommendation rendered by the Connecticut Department of Health Services regarding the development of new wells during a moratorium period, consideration should be given not to allow development of the site until such time the moratorium on new hook-ups is lifted and public water is made available to the site. Of course, this is provided all other environmental and planning limitations of the site can be surmounted and all local, state, and federal regulations complied with.

If permission is granted to drill an interim well or wells, they should ideally be located on a relatively high portion of the site, properly separated from the sewage disposal system(s), sewer mains or any other potential pollutants (e.g., road drainage, curtain drain) and in a direction opposite the expected direction of groundwater movement. They should all be cased with steel pipe into the underlying bedrock.

In order to provide adequate protection of the quality of bedrock water, all wells will need to be properly installed in accordance with all applicable State Public Health code and Connecticut Well Drilling Board regulations. In addition, the local sanitarian will need to inspect and approve well location(s). The interim well(s), if permitted, will need to be properly abandoned once municipal water mains become available to ensure that cross connection between a private well and the municipal water system does not occur.

# 9. THE NATURAL DIVERSITY DATA BASE

The Natural Diversity Data Base maps and files have been reviewed regarding the project area. According to the information, there are no known extant populations of Connecticut "Species of Special Concern" or Federal Endangered and Threatened Species that occur at the site in question. However, the information indicates that adjacent wetlands are important areas for maintaining water quality and habitat for downstream juvenile Atlantic Salmon. (Please see **FISH REOURCES** section)

Natural Diversity Data Base information includes all information regarding critical biologic resources available to us at the time of the request. This information is a compilation of data collected over the years by the Natural Resources Center's Geological and Natural History Survey and cooperating units of DEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultation with the Data Base should not be substituted for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available.

# 10. FISH RESOURCES

The headwaters of an unnamed tributary to Cabin Brook originate within the parcel considered for development. One of the primary functions of headwater stream reaches and their associated wetlands is to provide clean and unpolluted waters to downstream areas of the watershed. Therefore, it is extremely important that the proposed creation of the Pierpont Plaza Shopping Center will not directly or indirectly impact the water quality and aquatic resources of local watercourses. This report will address all potential impacts to aquatic resources expected from the development and delineate mitigation measures required to minimize impacts.

## ■ Fish Population

Habitat required for yearlong survival of freshwater fishes was not observed in either the unnamed tributary of Cabin Brook or the unnamed stream (off-site stream that will receive stormwaters) that outlets to Lincoln Lake. These streams in the area of confluence with Cabin Brook and Lincoln Lake will typically experience a seasonal penetration of fishes.

The exact fish assemblage of Lincoln Lake is not known; however, the following fish species can be expected to inhabit this ecosystem: largemouth bass, bluegill sunfish, pumpkinseed sunfish, chain pickerel, yellow perch, brown bullhead, American eel, and white sucker.

Cabin Brook is expected to support the following stream dwelling species: blacknose dace, white sucker, fallfish, American eel, golden shiner and other warmwater fish such as bluegill sunfish that inhabit nearby impounded waters.

## ■ Impacts

The following impacts can result during the construction of the shopping center if proper mitigation measures are not implemented:

■ **Construction site soil erosion and sedimentation of watercourses through increased runoff from unvegetated areas.** This development will be constructed on or adjacent to watercourses that drain into major aquatic ecosystems. During construction, topsoil may be exposed and become

susceptible to runoff events, especially if suitable erosion and sediment controls are not properly installed and maintained at the project site which often occurs. Cabin Brook has historically received excessive sediment deposits from various local sources i.e., housing construction, highway runoff, and sand excavation. Excessive sediment deposition could further damage downstream aquatic ecosystems in the following ways:

**(1)** Sediment reduces the survival of resident fish eggs and hinders the emergence of newly hatched fry. Adequate water flow, free of excess sediment particles is required for fish egg respiration and successful hatching.

**(2)** Sediment reduces the survival of aquatic macroinvertebrates. Since aquatic insects are important food items in fish diets, reduced insect populations levels in turn will adversely affect fish growth and survival. Fish require an excessive output of energy to locate preferred prey when aquatic insect levels decrease.

**(3)** Sediment reduces the amount of usable habitat required for spawning purposes. Excessive fines can clog and even cement gravels and other desirable substrate together. Resident fish may be forced to disperse to other areas not impacted by siltation.

**(4)** Sediment reduces stream pool depth. Pools are invaluable stream components since they provide necessary cover, shelter, and resting areas for resident fish. A reduction of usable fish habitat can effectively limit fish population levels.

**(5)** Turbid waters impair gill functions of fish and normal feeding activities of fish. High concentrations of sediment can cause mortality in adult fish by clogging the opercular cavity and gill filaments.

**(6)** Sediment encourages the growth of filamentous algae and nuisance proportions of aquatic macrophytes (CTDEP 1989). Eroded soils contain plant nutrients such as phosphates and nitrates. Once introduced into aquatic habitats, these nutrients function as fertilizers resulting in accelerated plant growth.

**(7)** Sediment contributes to the depletion of dissolved oxygen (CTDEP 1989). Organic matter associated with soil particles is readily decomposed by microorganisms thereby effectively reducing dissolved oxygen levels.

■ **Aquatic habitat degradation in streams due to the influx of stormwater drainage.** Stormwaters from the project site will directly outlet into two watercourses and their associated wetlands. Existing bank erosion in the unnamed stream that drains into Lincoln Lake may be exacerbated if excessive stormwaters are discharged to this watercourse. Stormwaters from the parking area can contain a wide variety of pollutants that are detrimental to aquatic

organisms. Pollutants commonly found in stormwaters are: hydrocarbons (gasoline and oil). herbicides, heavy metals, road salt, fine silts, and coarse sediment. Nutrients in stormwater runoff can fertilize stream waters causing water quality degradation. Additionally, fine silts in stormwaters that remain in suspension for prolonged periods of time often cannot be effectively removed from roadway catch basins and/or stormwater detention basins.

■ **Degradation of wetland habitat.** The proposed shopping center lots will be constructed within or adjacent to vital wetland habitat. Expected total wetland loss is 1.55 acres. Wetlands are critical to water quality maintenance and the ultimate health of local watercourses since they serve to: (1) control flood waters by acting as a water storage basin, (2) trap sediment from natural and man-made sources of erosion, and (3) help filter-out pollutants from runoff before they enter watercourses. Impacts such as polluted stormwaters and excessive stream sedimentation can negatively impact wetland complexes by hindering their ability to properly function e.g. the unique ability of wetlands to filter-out natural, man-made pollutants and store, control flood waters can be severely hampered when they become the recipient of excessive stormwater runoff.

■ **Impacts to downstream environments.** Water quality problems and habitat degradation that directly occurs at local drainages will be immediately observed downstream in either Cabin Brook or Lincoln Lake. Increased eutrophication (aging) or nutrient enrichment over time can be expected in Lincoln Lake if it receives elevated levels of nutrient enrichment from either sediment or stormwater runoff. Increased pond aging will result in the creation of dense algae blooms, sediment accumulation, nuisance amounts of aquatic vegetation, and increased production of microorganisms that cause fish disease.

## ■ Recommendations

The following recommendations are provided to assist with the mitigation of the previously outlined impacts.

■ **The extent of wetland disturbance should be minimized.** The current proposal should be designed to minimize wetland losses at all costs. According to consultant reports, the only functional wetland, the red maple swamp and drainage that outlets to Cabin Brook will be filled in, thereby, this proposed activity represents a net loss of wetland habitat. The applicant should reduce the overall

length of the proposed attached shopping center structure to limit either encroachment into or the ultimate loss of the red maple swamp.

■ **Install and maintain proper erosion and sedimentation controls during site construction activities.** This includes such mitigative measures as silt fences and staked hay bales. Only small areas of soil should be exposed at one time and these areas should be reseeded as soon as possible. If this development is approved, the Town of Colchester should have an appointed official that would be responsible for inspecting this development on a daily basis to ensure that contractors have complied with all stipulated mitigation devices. Past lake and stream siltation disturbances in Connecticut have occurred when individual contractors either improperly deployed mitigation devices or failed to maintain these devices on a regular basis. The town must be willing to immediately issue a cease and desist order if proper compliance with recommended measures is not being met.

■ **The developer should submit a detailed stormwater management plan for town review.** The effective management of stormwaters and roadway runoff can be accomplished through proper design, location, and maintenance of catch basins and detention basins. Engineers should review the efficacy of proposed stormwater facilities, especially the drywell detention system. Also, particular attention should be made to stormwater discharges that outlet at Kmick Lane to ensure that existing instream erosion within the unnamed watercourse is not accelerated. Gross particle separators should be utilized to collect runoff of parking lot toxicants. Maintenance is very critical. Catch/detention basins should be regularly maintained to minimize eventual adverse impacts to aquatic resources. Catch/detention basins will only trap heavy, coarse sediments reducing the likelihood of excessive stream sedimentation; however, waters that contain suspended enriched sediments and pollutants such as salts will eventually cause water quality and aquatic habitat degradation. The use of sodium chloride road salt to deice paved surfaces should be minimized. Calcium chloride should be primarily utilized since it is less environmentally harmful.

## ■ Bibliography

CTDEP (Connecticut Department of Environmental Protection) 1989. Non-Point Source Pollution: An Assessment and Management Plan. CTDEP, Hartford.

# 11. PLANNING CONCERNS

This proposal would create a shopping mall, which would include a separate bank building, totaling approximately 92,000 square feet. This would be situated on approximately 10.9 acres of land located on the south side of Route 16 across from Kmick Road. The area is zoned General Commercial which permits general business and commercial activities. The Regional Development Plan designates this property as suitable for Mixed Urban Uses.

The Mixed Urban Use category denotes intensive residential and/or economic development. These areas are intended to be served by both public water and public sewerage systems. The property is also adjacent to the designated economic center of the town.

The major planning concerns of this proposal deal with the site design and possible impact on the surrounding area including the Towns public water supply well field located south of this site.

## ■ Traffic Concerns

For commercial activities of this type to be successful they must attract customers and this results in traffic generation. Based on the TRIP GENERATION MANUAL of the Institute of Transportation Engineers this proposal has the potential to generate approximately 8,024 vehicle trips to and from the site each day. These vehicle trips are broken down as follows:

| ACTIVITY | TOTAL TRIPS | A.M. PEAK | P.M. PEAK |
|---|---|---|---|
| Shopping Mall | 7,005 | 166 | 603 |
| Bank | 1,019 | 24 | 95 |
| TOTAL | 8,024 | 190 | 698 |

While these numbers represent a significant traffic flow, the route which will be used to access this shopping area, Route 16, seems to have the capacity to handle this traffic flow adequately. The State of Connecticut Traffic Log for 1989 lists average daily traffic (ADT) volumes on Route 16 in the vicinity of this proposal to be as follows:

| LOCATION | ADT |
|---|---|
| **From Route 149 (Westchester Road) to the east bound access to Route 2.** | **8,500** |
| **From the east bound access to Route 2 to Route 85 (Main Street).** | **8,600** |

As the generalized capacity of a two lane State Road such as Route 16 is approximately 1,000 vehicles per hour per lane the additional traffic generated from this proposal should not exceed the capability of Route 16 to permit traffic to flow adequately. A condition to permitting the adequate flow of traffic in this area is adequate traffic controls such as traffic lights and road design such as turning lanes. As this proposal contains 446 parking spaces a State Traffic Commission permit is required. Obtaining this permit will require complete review of the present and proposed road design and traffic controls. It is recommended that this permit be obtained prior to local commission action on the proposal.

## ■ Site Design

The shape and size of this parcel of property create design limits. Generally the proposed building locations fit well onto the property with regard to setback and building orientation. The plan seems to propose a maximum building area layout for the parcel.

The topography is addressed through slope cuts and area fills. This aspect of the proposal has the potential to create problems with regard to erosion, sedimentation, and drainage during and after construction.

The town zoning regulations require (Sections 10.12.2/10.12.3) buffer areas between commercial and residential districts or between a proposed use and existing use. The exact limits of the towns zoning districts boundaries should be shown on the plan. The town zoning map indicates the depth of the commercial district to be 800 feet which is at or just beyond the southern property line of this parcel. Additionally existing residences are located on the eastern and north-western boundaries of this parcel. These areas should be shown more clearly on the plan especially in relation to the proposed landscaping plan in order to ascertain compliance with the regulations.

## ■ Groundwater Protection

With regard to groundwater protection there is a hierarchy of land uses which should be prohibited in significant water supply areas. In groundwater supply areas the contamination of concern is that which results from persistent, toxic or hazardous, organic and inorganic material which can in very low quantities render water non-potable. Any plan should address worst case scenarios and their results when in the area of a public water supply.

Land uses which are considered to provide a minimum risk to significant water supply areas are low-density residential uses.

Land uses which pose a major threat to significant water supply areas include retail store space. Some dangers of such a use are obvious, such as uses which store or utilize hazardous materials. Other aspects of such a use which pose a serious threat involve the interior use of a structure which may change with little local control. A clothing outlet can change to a new, more water supply threatening activity such as a photo processor.

Mitigating measures for any retail store space activity must include: sewers, careful on-site evaluation and stringent local control and inspection.

# 12. ARCHAEOLOGICAL REVIEW

A review of State site files and maps shows no prehistoric or historic sites in the proposed project area, and only one isolated prehistoric site in the vicinity located in the northwestern end of downtown Colchester.

An on-site review of the proposed project notes its proximity to a potential downtown Colchester historic district which would be eligible for the National Register of Historic Places. However, the Office of State Archaeology expects that the proposed shopping center would not adversely affect the historic and architectural integrity of this potential district if the structures are limited to two stories in height and all signage is located on Route 16. The distance and drop in elevation from the Main Street area to the proposed development site is sufficient to minimize any visual intrusion of the new construction.

In summary, the project area possesses a low degree of sensitivity for prehistoric and historic archaeological resources, however, downtown Colchester has the potential for a National Register Historic District. In this regard, it is recommended that the proposed shopping center structures be limited to two stories in height and all signs be located on Route 16. The Office of State Archaeology is prepared to offer the Town of Colchester and the developer any technical assistance necessary for the preservation of the town's archaeological and historical resources.

# ABOUT THE TEAM

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a varety of federal, state and regional agencies. Specialists on the Team include geologists, biologists, foresters, soil specialists, engineers and planners. The ERT operates with state funding under the supervision of the Eastern Connecticut Resource Conservation and Development (RC&D) Area --- an 86 town region.

**The services of the Team are 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, landfills, commercial and industrial developments, sand and gravel excavations, 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 official 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 and the ERT Coordinator. A request form should be completely filled out and should include the required materials. 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 and request forms regarding the Environmental Review Team please contact the ERT Coordinator: 203-345-3977, Eastern Connecticut RC&D Area, P.O. Box 70, Haddam, Connecticut 06438.