

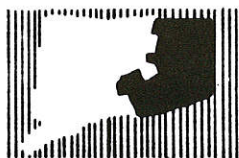
Hermann

environmental review team report



WATERFORD SQUARE

Waterford, Connecticut



RC & D

**EASTERN CONNECTICUT
RESOURCE CONSERVATION AND DEVELOPMENT PROJECT**

**ASSISTED BY: U.S. DEPARTMENT OF AGRICULTURE,
SOIL CONSERVATION SERVICE AND COOPERATING AGENCIES**

ENVIRONMENTAL REVIEW TEAM REPORT
ON
WATERFORD SQUARE
WATERFORD, CONNECTICUT

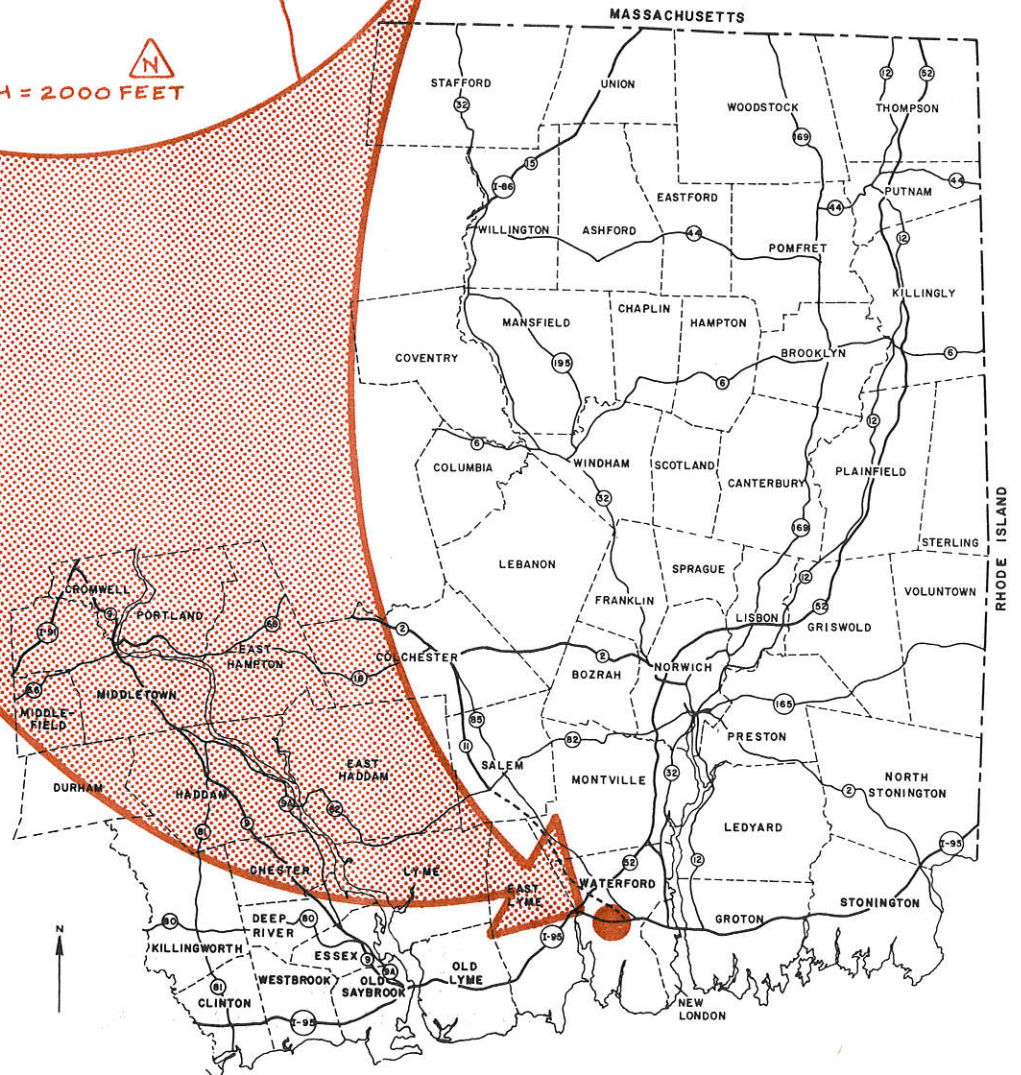
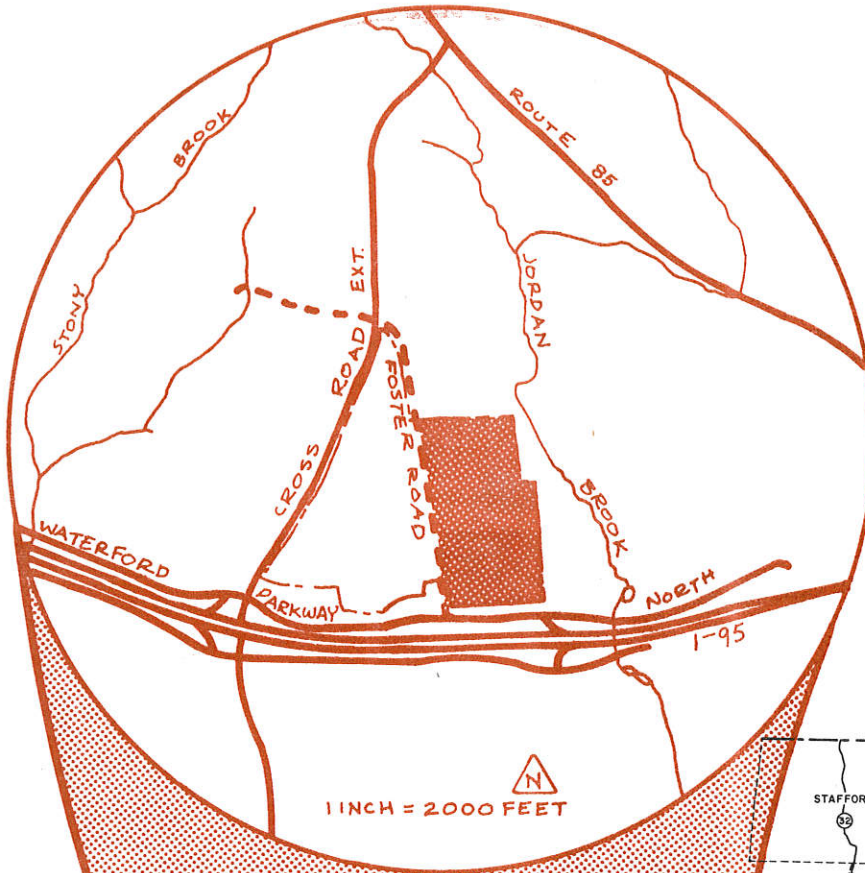
OCTOBER, 1974

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EASTERN CONNECTICUT RESOURCE CONSERVATION
AND DEVELOPMENT PROJECT
Environmental Review Team
139 Boswell Avenue
Norwich, Connecticut 06360

LOCATION OF STUDY SITE

WATERFORD SQUARE
WATERFORD, CONNECTICUT



EASTERN CONNECTICUT
RESOURCE CONSERVATION AND DEVELOPMENT PROJECT



ENVIRONMENTAL REVIEW TEAM REPORT

ON

WATERFORD SQUARE

WATERFORD, CONNECTICUT

This report is an outgrowth of a request from the Waterford Planning and Zoning Commission, with the approval of the landowners, 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) Executive Council for their consideration and approval as a project measure. The request has been approved and the measure reviewed by the Environmental Review Team.

The soils of the site were mapped by a soil scientist of the USDA Soil Conservation Service. Reproductions of the soil survey and a table of limitations for urban development were forwarded to all members of the Team prior to their review of the site.

The Team that reviewed the proposed development consisted of the following personnel: Sherman Chase, District Conservationist, Soil Conservation Service (SCS); Edwin Minnick, Civil Engineer, SCS; Sidney Quarrier, Geologist, Natural Resource Center, State of Connecticut Department of Environmental Protection (DEP); T.E. Linkkila, Wildlife Biologist, DEP; Clarence Merrill, Forester, DEP; Donald Capellaro, Principal Sanitarian; State of Connecticut Department of Health; David Miller, Climatologist, Connecticut Cooperative Extension Service; Gerhard Amt, Planner, Southeastern Connecticut Regional Planning Agency; Barbara A. Hermann, Team Coordinator, Eastern Connecticut RC&D Project.

The Team met and reviewed the site on September 19, 1974. Reports from each Team member were sent to the Team Coordinator for review and summarization.

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 developers and the Town of Waterford. 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 Council hopes you will find this report of value and assistance in making your decisions on this particular site.

If you require any additional information, please contact: Miss Barbara A. Hermann (889-2324), Environmental Review Team Coordinator, Eastern Connecticut RC&D Project, 139 Boswell Avenue, Norwich, Connecticut 06360.

INTRODUCTION

Early this year, the Environmental Review Team reviewed a parcel of land on Cross Road in Waterford for a proposed regional shopping mall known as Cross Road Plaza. Since that time the promoters of Cross Road Plaza, Chase-Resnikoff, have joined with the May Company to combine the original site with a parcel to the east and to redesign the complex to accomodate both Cross Road Plaza and another mall, Waterford Square.

The Planning and Zoning Commission requested the Team to provide them with resource information on the additional parcel and an evaluation of the new development proposal as it relates to the entire site. This report will first describe the existing resources on the site with most of the discussion relating to the site as a whole since the two parcels are part of the same ecosystem. Then the various aspects of development will be considered, followed by a brief summary of the major areas of concern. The report on Cross Road Plaza should also be used in conjunction with this report.

Recommendations or comments made within this report are presented for consideration by the developers and the town in the preparation and review of the development plans and should not be viewed as mandatory or regulatory in nature.

EVALUATION

EXISTING RESOURCES

Geology. The geology of the additional parcel of land is basically the same as the first parcel reviewed. It is underlain by gneissic and granitic bedrock. The surficial materials consist of till in the upland areas and swamp deposits in the lower areas.

Drainage. The new property presently drains into the Jordan Brook watershed, as did 63 percent of the original parcel. The topography map on the opposite page shows the site and its relationship to both Jordan Brook and Stony Brook.

Soils. A detailed soils map of the combined parcel is given in the Appendix to this report along with a soils limitations chart for the combined parcel. Due to the original scale at which the soils are mapped (1"=1,320') the lines shown on the soils map should not be viewed as precise boundaries, but rather as guide-lines to the distribution of soil types on the property. The soils limitations chart indicates the probable limitations for each of the soils for on-site sewage disposal, basements, landscaping, and streets and parking. However, limitations, even though severe, do not always preclude the use of the land for development. If economics permit greater expenditures for land development and the intended use is consistent with the objectives of local and regional development, many soils and sites with difficult problems can be used.

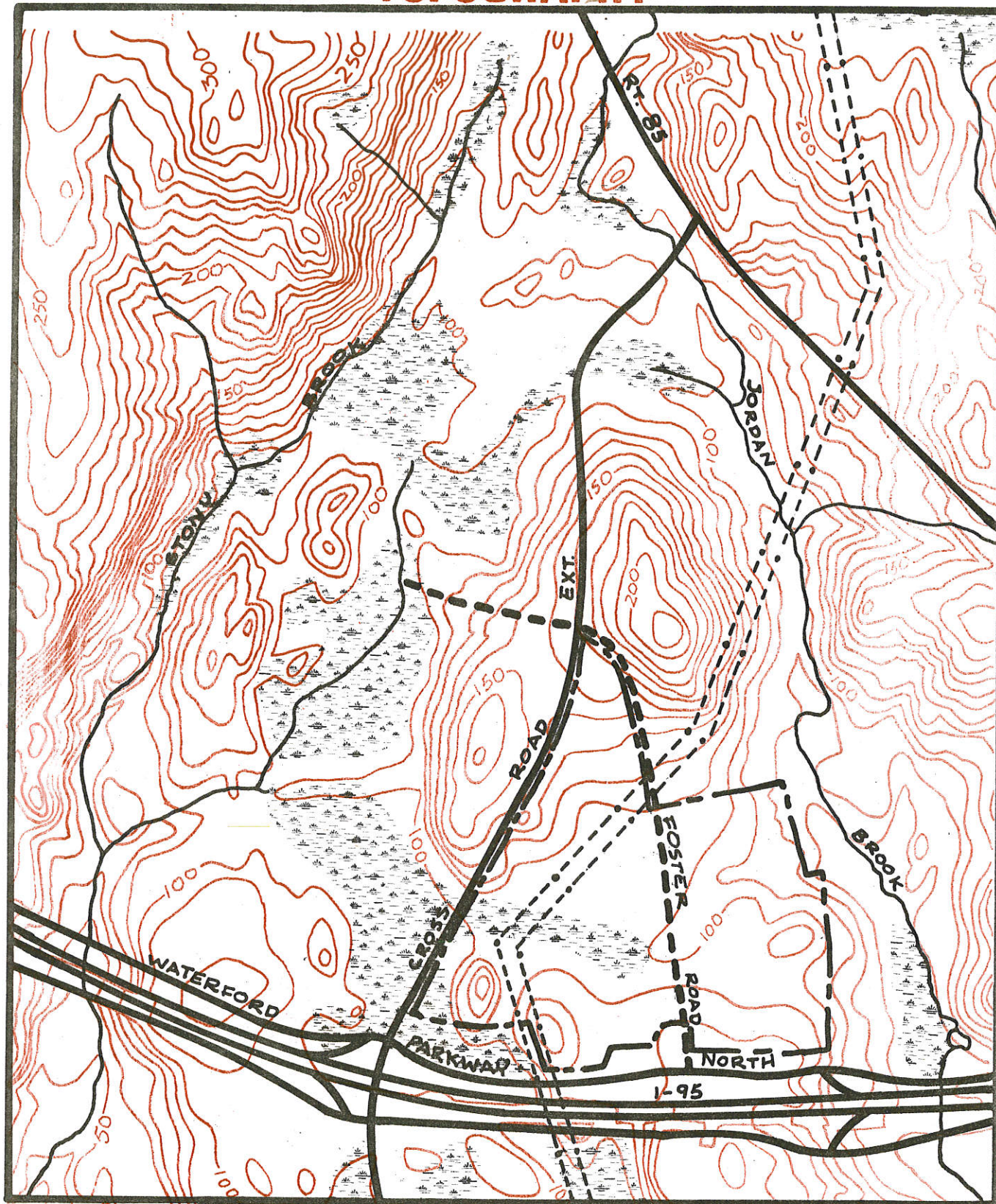
The percentage distribution of soil groups on the site remained about the same with the addition of the second parcel. Just over half of the site, 50.5 percent, falls within Natural Soil Group B, upland soils over friable to firm glacial till. These soils are formed in the thicker, unconsolidated deposits of till usually occurring on hillsides. Soils 650XB and 210BC have moderate to rapid permeability and do not have a high water table during any part of the year. On disturbed areas with slopes above 8 percent, soil erosion can be a problem. Soils 154XB and 154BC have a water table which remains within 15 to 20 inches of the soil surface during the period of highest saturation (usually early spring). Permeability above the water table is moderate.


The next largest group of soils are the inland wetlands which encompass 28.2 percent of the site (soils 825, 27, 27M, 291). Though they fall within three different Natural Soil Groups (A,C,G), their poor drainage characteristics cause them to be classified as inland wetlands, as defined by Public Act 155. These soils have water ponded on the surface for significant periods in winter and spring. The water table usually persists within 3 feet of the soil surface throughout the year.

The moderately and well drained soils of Natural Soil Group A, terrace soils over sands and gravels, encompass 15.2 percent of the site. They occur above flood plains in river and stream valleys and are underlain by water-deposited beds of sand or sand and gravel. Soils 63A and 213BC have rapid permeability with a low water-holding capacity. Soil 214AB has a moderately high seasonal water table (15 to 20 inches) with moderate to rapid permeability above the water table.

The remaining 6.1 percent of the site falls with Natural Soil Group C, upland soils over compact glacial till. Soil 31XA is moderately well drained with a slowly permeable hardpan at about 2 feet in depth. This soil also has a moderately high seasonal water table (15 to 20 inches).

TOPOGRAPHY



- 
 - - - - - PROPERTY LINE
 - - - - - POWER LINE
 - - - - - DIRT ROAD
 TOPOGRAPHIC CONTOUR LINE (10 FOOT INTERVALS)
 MARSH

$\triangle N$ 1 INCH = 1000 FEET

Vegetation and Wildlife. The site is comprised of mixed hardwoods, agricultural fields, grown-over fields and wet thickets. There is also a portion of the Cross Road Bog on the property. From a forestry viewpoint, there is little that has commercial value. However, the variety and proportion of the habitat types is such that the overall area provides nesting and food for such species as deer, quail, grouse, pheasant, rabbit, and song birds. Though there are no unique features on this property, the property as a whole is unique in that its varied habitats provide for more species of wildlife than would ordinarily be found in an area this size.

As mentioned in the previous report on Cross Road Plaza, Cross Road Bog, which lies to the west of the site, is a significant natural feature in this part of Connecticut due to the depth of the peat (40 to 45 feet). Though only a small portion of the bog is actually on the property, the possible off-site effects from items such as run-off and sedimentation must be considered when evaluating the proposal.

Land Use. Primary uses in the immediate vicinity of the site are of a light industrial nature. The nearest concentration of residential housing is along Cross Road, south of Interstate 95.

Zoning for the site is presently commercial. The proposed Plan of Development for Waterford, prepared by Purcell Associates, also shows a major commercial center in the triangle formed by I-95, Cross Road, and the proposed Route 11.

WATER SUPPLY

The Waterford Square and Cross Road Plaza complex is estimated to require 80,000 to 90,000 gallons of water per day. The source of water is to be the existing New London municipal supply. The adequacy of that system to supply this need should be confirmed with the utility.

A 12 inch main is proposed to service the site. Provided the water is available, this should be adequate. The installation of water transmission lines to service the shopping center should not be a major problem though stony or bouldery conditions may increase the cost somewhat.

The Jordan Brook area from I-95 south to Route 1A is included in the Plan of Conservation and Development for Connecticut as a high priority aquifer. There has been much discussion locally as to whether this aquifer actually has any value to the municipal water supply. In the Report on Water Works System for Municipalities of New London and Waterford (Fay, Spofford & Thorndike, Engineers, 1966, p. 24-25) it is indicated that exploratory work conducted by Hayden and Harding, Consulting Engineers, showed the Jordan Brook area and two other areas to be inadequate as major water supply sources. This was due to an estimated yield of, at best, 200 gallons per minute per well, from which it did not appear possible to economically provide the additional water supply required by the towns. However, the report did recommend purchase of well sites in this and other areas to allow for the development of emergency water supplies on short notice if the future need should arise. It therefore appears that the aquifer is of some potential value and that every reasonable precautionary measure should be taken to protect it.

WASTE DISPOSAL

Since the previous report, it has been determined that it will not be pos-

sible to extend sewers to the site in time for the opening of the shopping center. On-site sewage treatment facilities with subsurface disposal are being proposed as an interim measure. The estimated sewage flow would be around 80,000 to 90,000 gallons per day.

As stated in the earlier report, the soils map indicates a considerable amount of well-drained land (10 acres) suitable for installation of subsurface sewage disposal systems. However, there are several questions or potential problems which have been raised relating to the quantity of effluent being disposed and the indication on the plans that the leaching area will be paved over for streets and parking lots.

First, with respect to the quantity of effluent disposed, the concern centers around the impact on local ground and surface water in terms of both quantity and quality. Preliminary calculations indicate that the ground materials in the local drainage basin discharge approximately 30,000 to 80,000 gallons per day of ground water into the local wetlands which then drains into Jordan Brook. The 80-90,000 gallons per day of effluent represents a great increase to the system and local ground water and surface discharges into Jordan Brook will reflect both the quality and quantity of this effluent. Some of the questions which are raised are:

1. Will the additional discharges raise local ground water levels? If so, this could affect the amount of fill required in certain areas and the feasibility for discharging storm run-off through subsurface systems.
2. Will this increase surface flows into Jordan Brook? If so, will this along with storm run-off, create or intensify flooding problems downstream?
3. What will the effect be on surface and ground water quality? Every reasonable precautionary measure should be taken for protecting the aquifer and Jordan Brook from pollution by any of the potential sources of materials which can be expected with a complex of this magnitude. Wastes which cannot be handled by the treatment system or that would interfere with proper operation of leachfields should be handled and disposed of separately.

Regarding the paving over the leaching field, there are several items that appear worthy of consideration.

1. Percolation tests should be conducted after the final grading operation.
2. Failure of the system will require more expensive repair measures.
3. Any build up of effluent close to the surface may cause abnormal failure of the pavement due to frost heaves.
4. With little or no dilution due to surface water infiltration, there may be a high concentration of septic effluent entering the ground water.

(The sewage treatment and disposal facilities will have to be approved by the State Department of Environmental Protection.) A public hearing would be required as part of the approval procedure. It would be expected that at the time municipal

sewers become available, the on-site facilities would be eliminated. (Facilities to accomodate connection to municipal sewers should be installed during the original construction of the shopping center.)

FOUNDATION DEVELOPMENT AND GRADED CONDITIONS

Foundation Development. In comparing the site development plan with the soils map, it appears that about 25 acres of wetland soils will be disturbed by the installation of this shopping mall. This soil has very severe limitations for most urban uses. Intensive drainage and land fill measures are necessary to overcome the high water table. The preparation of the land to make it suitable for development will probably be a major cost item.

The use of these wetlands will have to be approved by the local inland wetlands agency. There was some discussion that the use of these wetlands was going to be traded off by preserving the portion of the bog on the property. The ecological value of this part of the bog may not be very great since the bog area east of Cross Road is not very large and has already been disturbed by the construction of Cross Road and the electric transmission lines. However, the small bog area will serve an important function as a settling area for run-off before the water reaches the major bog west of Cross Road.

Erosion and Sedimentation. An unspecified amount of filling is proposed for the central area of the site. While in process, this grading and filling could present a potentially major erosion and sediment problem which would be for the most part discharged into Jordan Brook. As recommended previously, an effective erosion and sediment control plan should be developed prior to any construction. The developers should be required to conduct their operations so that sediment laden waters will not be discharged into Jordan Brook or Cross Road Bog.

Drainage. One of the major questions associated with a project of this nature is the increased amount of run-off resulting from buildings and parking lots. According to the developers' plan, the entire plaza's storm drainage system will outlet into the existing small seasonal brook located on the eastern portion of the property. This small seasonal brook flows through property not owned by the developer for several hundred feet before entering Jordan Brook.

An estimate of the increased run-off from the site into Jordan Brook during a major storm has been made. The following table is approximate and based only upon the area contained within the property development boundaries. The peak discharge computations for the 25 year-24 hour storm event are based on the Soil Cover Complex Method of computing run-off. These peak discharges represent the amount of storm water leaving the property by way of the small seasonal brook, both under the existing conditions and with the proposed plaza installed.

COMPARISON OF PEAK DISCHARGES ON SITE
FOR EXISTING CONDITIONS AND PROPOSED DEVELOPMENT
FOR THE 25 YEAR-24 HOUR STORM*

Average Watershed Slope	Drainage Area		Peak Discharge <i>Culvert</i> Ft./Sec.		Percentage Increase In Peak Discharge
	Existing	With Plaza	Existing	With Plaza	
4%	74 acres	90 acres	56	340	<u>507</u>

* The Soil Cover Complex Method of run-off computations was used to arrive at these figures. This method provides a more realistic estimate of run-off from small watersheds than other methods. For those persons familiar with this method, the CN (curve number) was determined to be 65 under existing conditions and 90 with the proposed development.

It appears fairly obvious that unless remedial measures are taken, the small seasonal brook would afford an inadequate outlet for such an increase in storm discharge due to the installation of the plaza.

Planning and handling storm water discharge should be evaluated with respect not only to the site, but also to the cumulative effect of this and future development within the Jordan Brook watershed. The prime concern is with increasing the flood potential downstream of the site. It has been indicated that there presently is little margin of safety along portions of the brook south of Flanders Road.

Approximately 1000 acres or 45 percent of the Jordan Brook watershed is zoned for commercial and/or industrial uses. If storm drainage on developed sites is discharged directly into surface waters, development of 50 percent of the land in commercial and industrial zones would result in a 50 to 150 percent increase in peak storm flows on Jordan Brook. If the Town concludes that this increase would produce undesirable effects on downstream properties, then it is recommended that this and each future area of development be required to regulate their site's storm drainage so as to prevent increases in peak discharge off of their site.

The basic concept behind this kind of regulation would require each developer to calculate the peak discharges that flow off of their site under natural or existing conditions, and that peak discharges from the developed site would not exceed these values. A design storm, such as the ten year storm, could be used for these calculations. This type of storm drainage control is beginning to be used in several parts of the country, and it probably represents one of the better approaches to controlling stream flow changes in urbanizing areas. However, it is essential that this type of regulation be implemented early in the development stage of a stream basin and that each and every land user must be required to regulate the discharge off of his site if the net result is to be achieved. It is recommended that Waterford seriously consider using this type of required storm drainage control on the Jordan Brook stream basin.

In discussing run-off control for the Waterford Square site, a suggestion was made that the storm discharge might be infiltrated into the fill materials to be placed over the wetlands in the eastern portion of the site. Successful accomplishment of this may be rather complicated since the added ground water discharges from the sewage disposal system may raise groundwater levels so that there is insufficient

thickness of unsaturated material for infiltration of storm discharge to occur.

ROADS AND UTILITIES

Existing. There will be increasing dependence upon Cross Road with construction of the shopping center to the extent that all or part of Cross Road will have to be rebuilt. In the vicinity of Cross Road Bog it is recommended that any widening occur to the east of Cross Road so as to minimize the damage to the major portion of the bog.

Proposed. Parking areas and roads that are to be developed on the wetland soil will require intensive drainage and landfill measures to prevent costly maintenance. The soils limitations chart also indicates potential problems with slopes, stoniness, and seasonal high water table.

Development of this site, particularly with respect to traffic, should be related to the overall future development of the area between Cross Road and Route 85. This is especially important with respect to the proposed Route 11. The possible future need for an east-west road about 1000 to 1500 feet north of and parallel to I-95 should be determined as well. If such a road is desired, its relationship to the shopping center, Cross Road, and Route 11 should be decided and incorporated into the various development plans.

HAZARDS

Various potential hazards exist with a development of this size. Flooding, erosion, loss of wetlands, and pollution of ground water are possibilities which have been discussed previously in this and the previous report. Another potential hazard relates to air pollution. This project will fall under the new State regulations regarding indirect sources of air pollutants. In evaluating this proposal, the combined effects of I-95, Route 11 when completed, and shopping center traffic should be considered.

AESTHETICS AND PRESERVATION

Vegetation and Wildlife. With respect to the existing vegetation and wildlife on the site, development as proposed would result in a total loss. Regarding adjacent land areas, particularly Cross Road Bog, the quality and quantity of runoff both during and after construction should be controlled to minimize any possible damage. One potentially hazardous problem that should concern construction inspectors is the possibility for oil and fuel spills during construction. Methods for dealing with this possibility should be determined in advance of construction.

Microclimate. The area is relatively level and exposed, so microclimatic changes will not be critical to the development. However, wind breaks of evergreen species (1-2 rows) along the roads and through the center of the development along the transmission right-of-way would reduce wind velocities over the site and improve the area in terms of human comfort.

Additional vegetative barriers adjacent to I-95 and the future Route 11 would aid in noise control and therefore enhance the whole development. Noise reduction may be on the order of 20 to 30 percent in the frequencies which are irritable to people.

COMPATIBILITY OF SURROUNDING LAND USES

The shopping center appears to be compatible with existing land uses in the vicinity. The operators of the distribution activities along Cross Road may not like the increased traffic that trucks will have to contend with, but improvements to Cross Road may compensate for this. Under present zoning, the project should also be compatible with future development as well.

ALTERNATIVE LAND USES FOR AREA

The land could be used for almost anything. It is attractive in its natural state, but access makes it more desirable or valuable for economic activity. An industrial park development would be a desirable and possibly preferable use of this site in that it would allow a more acceptable "fitting" of buildings, roads, and parking lots into the natural landscape. Much of the present attractiveness of the area could be retained with such a development.

At the same time, the unique access to the site makes it a very logical location for a major shopping center. However, the question was raised by several Team members as to whether the development plans could be revised to reduce the amount of wetland soils filled. It is recognized though, that even with rearrangement of the facilities, the irregular layout of the wetland soils on the site would necessitate modification of some of the soils.

SUMMARY

With a project the size of the Waterford Square and Cross Road Plaza proposal there are many potential problems which can arise. In this particular location the significant proportion of wetlands on the site, the proximity to Cross Road Bog, the need at least temporarily for on-site sewage disposal, and the present condition of Jordan Brook tend to intensify many of the problems or make their solutions more critical. Because this is the first major development within a large area zoned for commercial and industrial development, decisions made here will also set precedents for future projects.

The two areas of major concern on this site are the on-site sewage disposal and storm drainage systems. The questions here apply not only to the site itself, but to the whole stream basin as well. The way in which these items are handled on this site and on other sites in the commercial and industrial zones will be major factors in determining the future, long term character of Jordan Brook and Cross Road Bog. It is essential that the suitability and impact of these systems be evaluated on the basis of what will be the cumulative effect and impact on the stream basin if similar techniques were to be used for the full development of the entire commercial/industrial zone.

With Public Act 155, inland wetlands and water courses have received public recognition, and hopefully protection, for their value as a natural resource. Within the Act they are described as "an interrelated web of nature essential to an adequate supply of surface and underground water; to hydrological stability and control of flooding and erosion; to the recharging and purification of ground water; and to the existence of many forms of animal, aquatic and plant life." With the large portion of this site classified as inland wetlands which, according to present

plans, will be filled, they should also be a prime concern. An investigation of the present wetlands with regard to the above functions and whether these functions can be replaced by artificial means should be included within development plans. Also, a sincere attempt to redesign portions of the site to allow preservation of additional wetland areas would be desirable.

The value of Cross Road Bog was discussed in the previous report. However, the need for taking all reasonable precautions to protect the integrity and value of the bog cannot be overemphasized.

The location of this site with respect to existing and potential access makes it highly desirable for commercial development and it seems probable that such development will occur here. It is urged that particular care be taken in the preparation and review of the plans so that potential problems can be avoided or minimized. What is done on this site can only increase in significance as the surrounding area is developed.

APPENDIX

SOILS MAP

WATERFORD SQUARE AND CROSS ROAD PLAZA
WATERFORD, CONNECTICUT



Prepared by: UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service

ADVANCE COPY, SUBJECT TO CHANGE

SEPTEMBER, 1974

SOILS LIMITATIONS CHART

Natural Soil Group*	Mapping Symbols	Acres	Percent of Total Acres	Limitations For:**			Principal Limiting Factor(s)
				On-Site Sewage	Base- ments	Land- Scaping	Streets and Parking
A-1a	63A	7.0	7.1	1	1	1	1
A-1b	213BC	3.0	3.0	1	1	1	1
A-2	214AB	5.0	5.1	2	2	1	2
A-3b	825	9.0	9.1	3	3	3	3
B-1a	650XB	14.9	15.0	2	1	2	3
B-1c	210BC	29.1	29.3	2	2	3	3
B-2a	154XB	4.4	4.4	2	2	2	2
B-2b	154MBC	1.8	1.8	2	2	3	3
C-2a	31XA	6.0	6.1	3	2	2	2
C-3b	27,27M	3.2	3.2	3	3	3	3
G-3b	291	15.8 99.2	15.9 100.0	3	3	3	3

* Refer to Know Your Land, Natural Soil Groups for Connecticut, Soil Conservation Service, USDA Connecticut Cooperative Extension Service, for further explanation of the natural soil groups.

** Limitations: 1-slight; 2-moderate; 3-severe.

SOILS LIMITATIONS CHART

ACREAGE SUMMARY OF SOILS LIMITATIONS

	<u>Slight</u>		<u>Moderate</u>		<u>Severe</u>	
	<u>Acres</u>	<u>%</u>	<u>Acres</u>	<u>%</u>	<u>Acres</u>	<u>%</u>
On-site Sewage	10.0	10.1	55.2	55.6	34.0	34.3
Basements	24.9	25.1	46.3	46.7	28.0	28.2
Landscaping	15.0	15.2	25.3	25.5	58.9	59.3
Streets and Parking	10.0	10.1	15.4	15.6	73.8	74.3