

# **CBD Update and Proposed Business Expansion Area**

**Hebron, Connecticut**

## **Eastern Connecticut Environmental Review Team Report**

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

# **CBD Update and Proposed Business Expansion Area**



## **Environmental Review Team Report**

**Prepared by the  
Eastern Connecticut Environmental Review Team  
of the Eastern Connecticut  
Resource Conservation and Development Area, Inc.**

**for the  
Conservation Commission and  
Economic Development Commission  
Hebron, Connecticut**

**June 2000**

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# Acknowledgments

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

The Eastern Connecticut Environmental Review Team Coordinator, Elaine Sych, would like to thank and gratefully acknowledge the following Team members whose professionalism and expertise were invaluable to the completion of this report.

The field review took place on Wednesday, January 26, 2000.

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I would also like to thank Michael O'Leary, town planner, John Soderberg, wetlands agent, Tom Fenton, town engineer, Raymond Griswold, fire marshal, Robert Musson, town assessor, Steve Knauf, health department, John Mullaney, conservation commission and Roderic McCorrison, local developer, for their cooperation and assistance during this environmental review.

Prior to the review day, each Team member received a summary of the proposed project with location and soils maps. During the field review Team members were

given additional information. Some Team members made individual or additional visits to the project site. 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 plans 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 landowners. This report identifies the existing resource base and evaluates its significance to potential development, and also suggests considerations that should be of concern to 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 reviewing the potential business expansion zone.

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# Introduction

## Introduction

The Hebron Conservation Commission and Economic Development Commission have requested assistance from the Eastern Connecticut Environmental Review Team in conducting an update of the 1984 ERT report for Hebron's Central Business District (CBD) and a review of an adjacent area for a potential business expansion zone.

In 1984 the ERT was asked to prepare a natural resource inventory and evaluation of the Central Business District, an area of approximately 130 acres, north and south of Route 66 east of Route 85 (Church Street). The town was concerned with the rapid growth being experienced and its impact on the natural resources. At that time there were no public water or sewer lines available to the area. Soil conditions were found to be the major limitation to future development because of seasonal high water tables and stoniness. These conditions make the proper installation and functioning of on-site septic systems difficult and costly.

The town is now considering designating a business expansion area in the update of the Plan of Conservation and Development. The proposed business expansion zone is approximately 160 acres south of Route 66 with frontage on Route 66, Route 85 (Church Street) and Kinney Road. (See Figures 1, 2 and 3)

## Objectives of the ERT Study

The 1984 ERT report was a valuable review for the town. It identified a number of important issues at the time. Now, 15 years later, the town has requested an update due to significant changes that have occurred since 1984. Those changes include introduction of a sewer system, additional development in the existing Central

Business District and the proposed business expansion area. The town is developing plans for a mixed-use business expansion area which could include retail, commercial, office, light industry and residential uses. The ERT review will provide valuable base information for the town in developing new goals and policies for the CBD within the Plan of Conservation and Development, and for planning the business expansion zone and development of a conceptual master plan for this area. The ERT was asked to provide updated information on the natural resource base, and to make recommendations and suggest guidelines to protect those resources. Team members were presented with a preliminary concept plan for a new town center on which to base their evaluations (see Figure 3).

## **The ERT Process**

Through the efforts of the conservation and economic development commissions this environmental review and report was prepared for the Town of Hebron.

This report provides an information base and a series of recommendations and guidelines which cover the topics requested by the commission. Team members were able to review maps, plans and supporting documentation provided by the applicant.

The review process consisted of four phases:

1. Inventory of the site's natural resources;
2. Assessment of these resources;
3. Identification of resource areas and review of plans; and
4. Presentation of education, management and land use guidelines.

The data collection phase involved both literature and field research. The field review was conducted on Wednesday, January 26, 2000. Some Team members made individual and/or additional site visits. The emphasis of the field review was on



the exchange of ideas, concerns and recommendations. Being on site allowed Team members to verify information and to identify other resources.

Once Team members had assimilated an adequate data base, they were able to analyze and interpret their findings. Individual Team members then prepared and submitted their reports to the ERT coordinator for compilation into this final ERT report.

Figure 1.



Location and Topographic Map

Scale 1" = 2000'

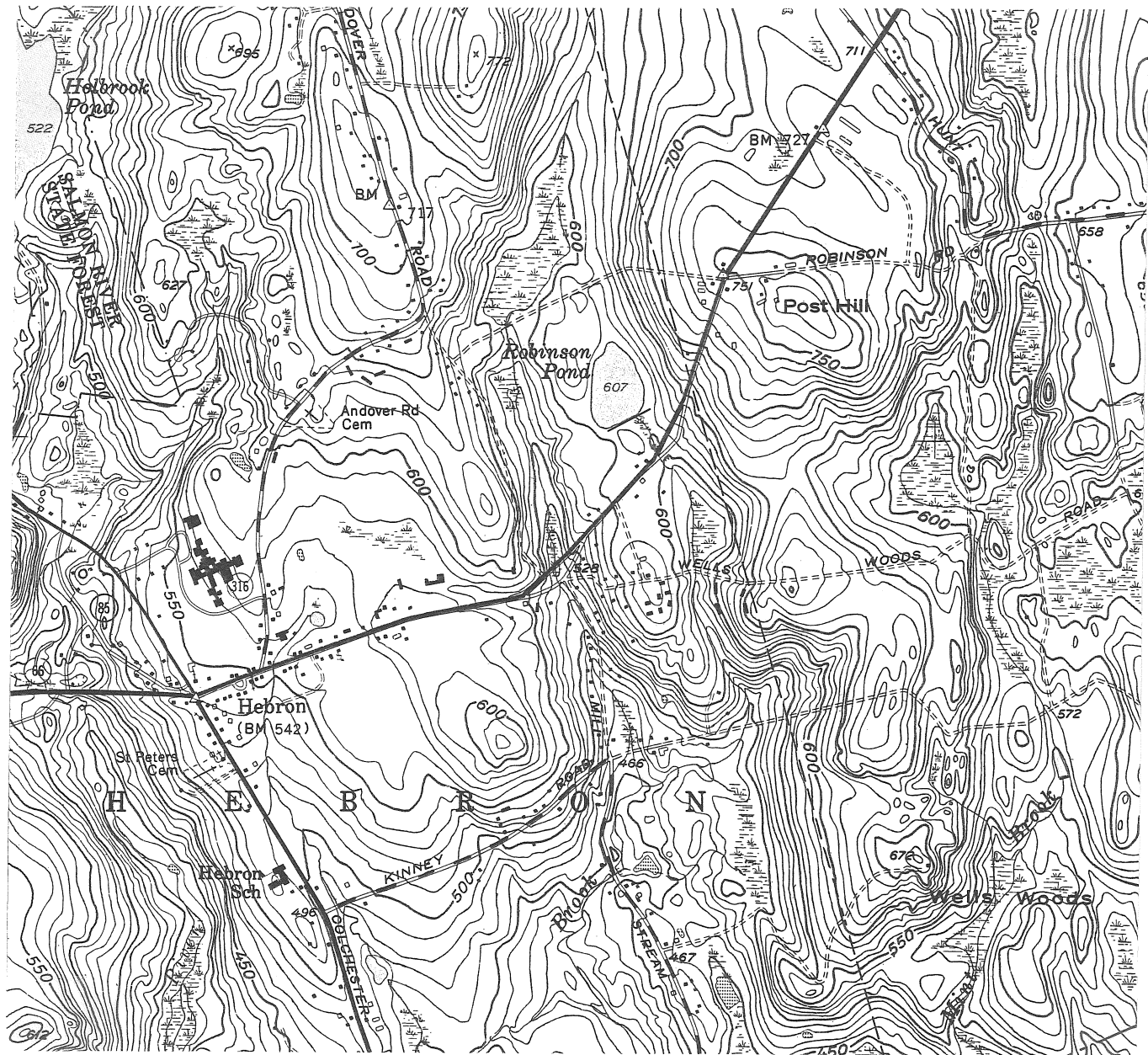


Figure 2.

Hebron Town Center

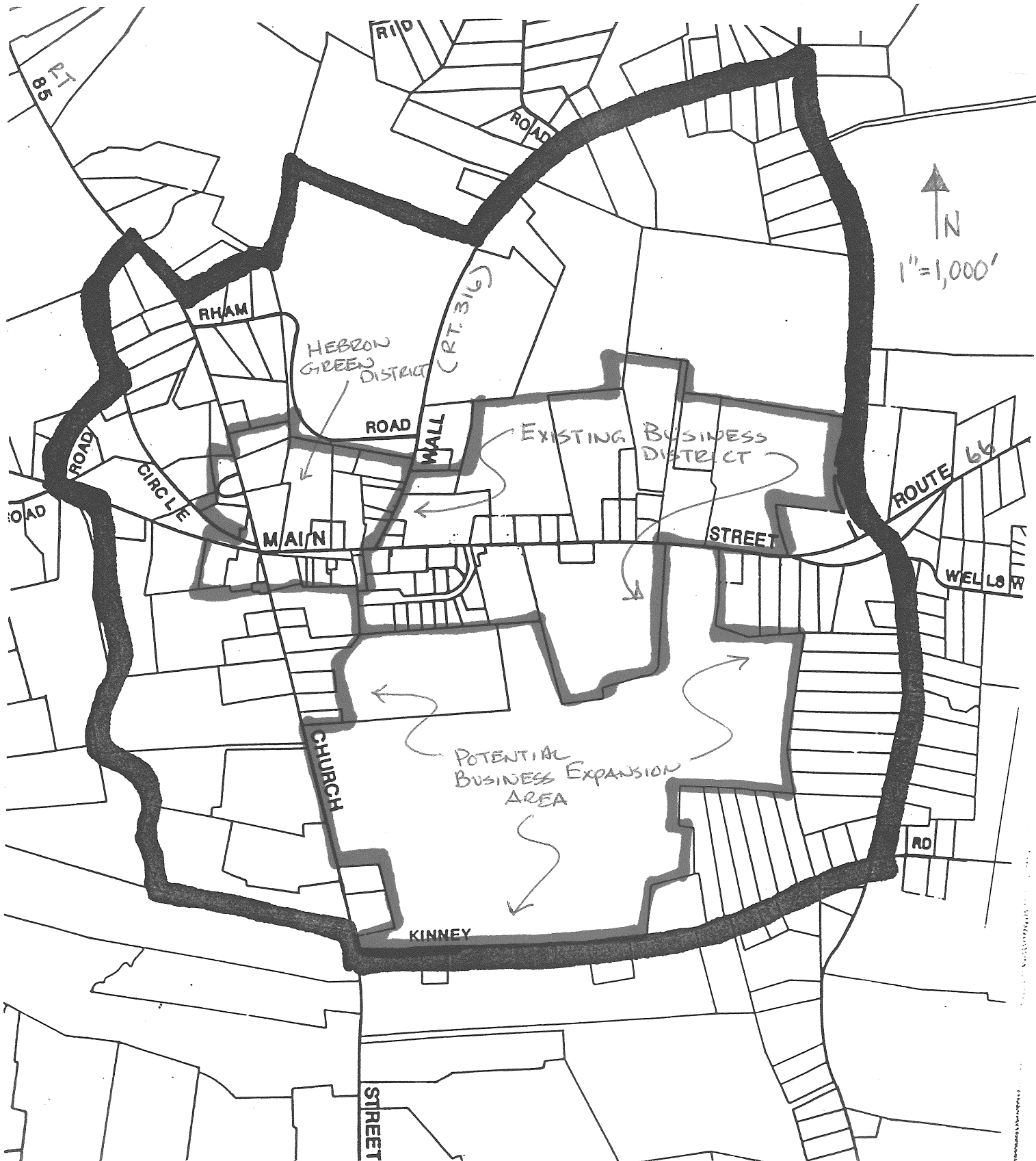
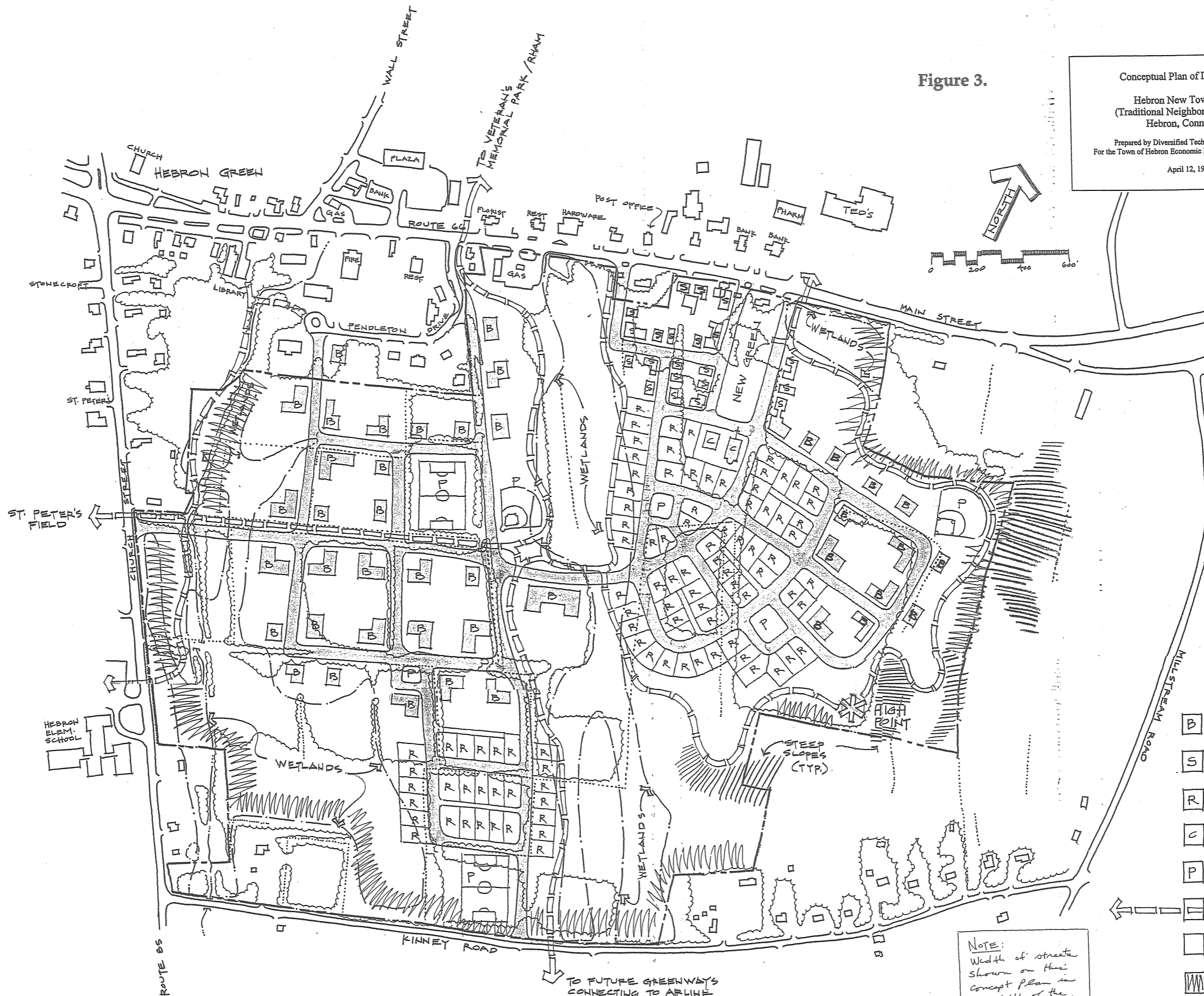


Figure 3.

Conceptual Plan of Development  
 Hebron New Town Center  
 (Traditional Neighborhood District)  
 Hebron, Connecticut  
 Prepared by Diversified Technology Consultants  
 For the Town of Hebron Economic Development Commission  
 April 12, 1999



**New Town Center - Hebron, CT**

**Intent:**  
 Create integrated, mixed-use, pedestrian-oriented neighborhoods with a balance of light industry, offices, retail businesses, civic buildings, parks and housing clustered in planned settings around a defined center. This new village will provide jobs for residents, increase the tax base, reduce the need for automobile travel, preserve natural features, maximize open space, and enhance Hebron's small town ambience.

**Objectives:**

- Preserve and enhance the economic vitality of the town center and strengthen civic pride.
- Discourage typical suburban development patterns.
- Protect and enhance Hebron center's scenic, historic and natural beauty.
- Encourage a diversity of housing types for a wide range of economic levels and age groups.

**Planning and Development Strategies:**

1. **Density:** A higher density of development and pedestrian-oriented streets will protect natural features and create a park-and-walk environment. Such densities will also reduce the extent of costly new roads and public utilities.
2. **Public Spaces:** Incorporate quality, usable public spaces and landmarks into the village to establish a "sense of place" uniquely identifiable to Hebron to visually and culturally unite the new village with Hebron's historic town green.
3. **Symbolic Center:** The center of the village should be designed as the district's symbolic center with a strong public orientation. The buildings within the village center should focus activity on a new green and integrate with the surrounding mixed-use area(s).
4. **Historical Context:** Encourage materials and methods of construction that echo and reinforce the vernacular architecture of Hebron and environs.
5. **Buildings:** The scale of buildings should relate to the human form and surrounding buildings in terms of orientation, massing, height and ornamentation (consistent in scale and massing to the buildings fronting on Hebron's historic green).
6. **Parking:** Create and adopt new parking codes that recognize availability of on-street parking, shared use of parking lots due to proximity of uses, more pedestrian, etc.
7. **Streets:** The street network would be interconnected and be characterized by small blocks, narrow access, on-street parallel parking and minimal utility at corners.
8. **Sidewalks:** Streets should have sidewalks, street trees and pedestrian-level, period street lights.
9. **Greenways:** Create an open space network with pedestrian/cycling trails that will link the village to the town's established commercial district, the historic Hebron Green, Hebron Elementary School and other future greenways.
10. **Open Space Preservation/ Buffers:** The new village should have a well-defined edge, such as agricultural greenbelts, recreational greenways and wildlife corridors, permanently protected from development.

- [B] COMMERCIAL/BUSINESS
- [S] RETAIL SHOPS
- [R] RESIDENTIAL LOT
- [C] CIVIC
- [P] RECREATION/PARKS
- [←] BIKE/PEDESTRIAN PATH
- [ ] NATURAL/WETLANDS
- [▨] BUFFER

**NOTE:**  
 Width of streets shown on this concept plan is the width of the street R.O.W. - The actual paved width will be 60% of that.

# Topography and Geology

## Topography

The topography of the land proposed for expansion of the Central Business District (CBD) was carved by the passage of the last Ice-Age glacier. Glacial erosion tends to form a relatively streamlined surface which allows more easy passage of the ice mass. Hence the topography is relatively subdued with nearly flat or gentle slopes in the higher elevations (600+ elevation) and gentle to moderate south and southwesterly facing slopes. The only steep slopes are found outside the proposed CBD expansion area associated with the Mill Stream drainage to the west. Most of the slopes will have little effect on the proposed development.

An interesting feature of the topography of the proposed expansion area and the surrounding land is a topographic grain to the land. *Aligned* valleys, steep slopes, and drainage divide low spots are oriented north-northwest south-southeast (~165°). These alignments are controlled in part by bedrock fractures and will be discussed below.

## Surficial Geology

Surficial deposits of the Columbia Quadrangle (Hebron CBD is located in the NW/4 of the SW/4 of the quadrangle) were mapped by Zizka (1978), who showed that the entire area of the proposed expansion is covered by "glacial till" of variable thickness; the till is thin, however, on the steep slopes adjacent to Mill Stream. Till is a poorly sorted mixture of mud, sand, and rock deposited beneath the glacier as the glacier moved over the land and was left behind after the glacier melted. Till deposited beneath the glacier tends to be compact and has low permeability (poorly-drained). Till left behind as the ice melted tends to have less clay material, is not particularly compact, and most is moderately well

drained. Zizka did not distinguish between the two on his map. Hence, some of the proposed expansion area may be poorly drained in the Team geologist's opinion. No unconsolidated resources, such as sand or gravel, will be lost by the proposed development.

## **Bedrock Geology**

Bedrock exposures are not found inside the proposed expansion area according to mapping by George Snyder (1967). The Canterbury Gneiss underlies almost all of the proposed CBD expansion area and scattered exposures of the gneiss crop out on the steeper easterly facing slopes adjacent to Mill Stream. The Canterbury Gneiss is a light colored foliated metamorphic rock composed of potassium feldspar, quartz, and biotite mica. The foliation of the Canterbury Gneiss strikes SW and dips (is tilted) 15-20° NW. One of the prominent fracture directions in most of this area of New England is parallel to the local foliation planes. Snyder did not measure the orientation of many fractures in the Canterbury Gneiss, but the ones that are found on his map are oriented ~165° and dip 65° (NE). Thus, it is likely that at least two prominent sets of fractures exist in these rocks: foliation parallel fractures and high-angle NNW-SSE fractures .

## **Bedrock Hydrology (Groundwater)**

Most domestic water wells in this area are recharged by bedrock aquifers. Metamorphic rock has practically no porosity to hold groundwater except for fractures. Water is only able to enter well-bores through the fractures that the well intersects. The more fractures, generally the better supply of water. Because fracture orientation is one control of topography, analyzing a topographic grain provides clues to potential areas with more closely spaced (denser) fractures and hence to areas with better groundwater resources. Several NNW-SSE topographic lineaments, where increased fracture density may be encountered, pass through Hebron with a semi-regular spacing of about 3/8<sup>th</sup> mile. Two pass through the proposed CBD expansion area (see Figure 4).

A corollary to increased water supply, greater fracture density also suggests increased permeability and faster rates of groundwater dispersal *and also* faster rates of dispersal of potential contaminants that may enter the groundwater system. Dispersal direction of the NNW-SSE lineament fractures will likely be toward the SSE and Kinney Road, down the probable hydraulic gradient (which roughly parallels the topographic gradient in most of CT). Dispersal direction of the foliation-plane fractures will be down-dip, toward the NW and Hebron Village. Potential contaminants may also flow toward the west and southwest along the till/bedrock interface that roughly parallels the topography.

## **Conclusion**

Potential negative impact of development of an expanded business area involves accidental introduction of toxic substances into the hydrologic systems, both surface and ground water. Because much of the development will take place on upland slopes and flat areas, impact of serious accidents will likely be felt down-slope, both in the natural surface drainage basins and in the bedrock groundwater aquifer.

## **References**

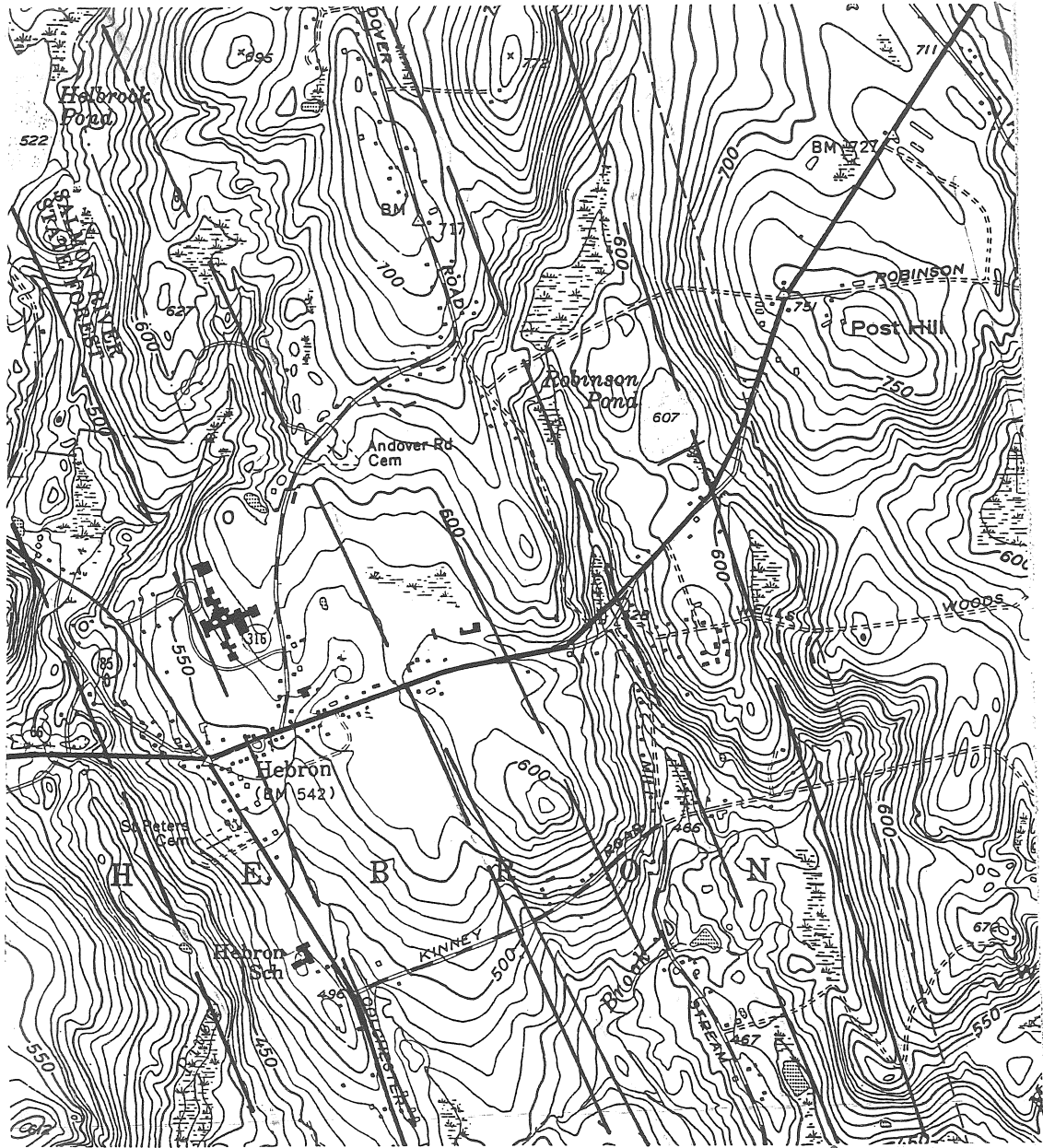
- Snyder, George, 1967, Bedrock Geological Map of the Columbia Quadrangle, East-Central Connecticut. U.S. Geol. Surv. Geol. Quad. Map GQ-592.
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Figure 4.



Inferred Fracture Zones

Scale 1" = 2000'



Inferred Fracture Zones



# Water Resources

## Surface Water Hydrology

The Hebron Center Business District site is mostly within the Raymond Brook watershed, with a small portion of the western area in the Jeremy River watershed. The proposed business expansion site is all within the Raymond Brook watershed. The watershed figure (Figure 5) shows the watershed divides, and further breaks them down into local drainage basins. The site is located in the mid to upper watershed of Raymond Brook. Raymond brook is a second order tributary to the Jeremy River, with a 8.7 square mile drainage basin. The proposed business expansion site drains in three directions to on-site wetlands and two small headwater streams to Mill Brook to the south. All of these flow south to Raymond Brook. Stream flow in head water streams such as these (originating in upland till), would be expected to be quite variable, with short high flows during the wet season and quite low base flow during the summer. These headwater streams generally have limited fisheries values but do provide clean cool water to downstream areas.

The state sets water quality standards and classifications for all surface and ground waters. Waters are classified according to their water quality conditions and designated use. Water quality criteria are established based on the designated use, and standards are established to protect and maintain its use and quality. Streams on and adjacent to the site are all classified as "A". Class A streams have overall excellent water quality, and are considered fishable/swimable (suitable for recreational use, good fish and wildlife habitat), and suitable for agricultural and industrial supply, and potential drinking water supply. Wastewater discharges are prohibited to Class A waters. The attached figure (Figure 6) shows water quality classifications and known pollution sources.

## Groundwater Resources

The previous ERT Report did a good job in describing groundwater resources on and adjacent to the site. Groundwater resources, or aquifers, are determined by the geologic conditions on the site (see the geology section for more detailed information). Statewide aquifer information is summarized on the map Groundwater Availability in Conn., D Meade, 1978. There are two basic types of aquifers in the state: bedrock/till aquifers; and stratified drift (sand & gravel) aquifers. Generally bedrock/till aquifers are low yielding, 1 to 10 gallons per minute (GPM) and are suitable for small domestic supplies.

Stratified drift are the most productive aquifers and are especially high yielding where deposits are thick, transmissive and hydraulically connected to large streams. The site is comprised of till overlying bedrock. This site's bedrock aquifer is generally suitable for small to moderate residential and business uses. The site and surrounding areas are all served by on-site private and public bedrock wells. The previous report indicates that published information shows yields of 3 GPM or more were observed in 80% of the wells in the area. The largest potential aquifer in the area is located approximately one and a half miles south along Route 85 in the Amston area. This stratified drift aquifer is small/moderate in size, published information about it is limited and inferred, and no known specific yields have been estimated. Typical yields could be in the moderate range (50 - 1000 GPM), and could potentially support a small municipal supply. The attached figure (Figure 7) shows the public water supply sources in the area. It should be noted that a number of additional transient non-community wells exist which are not on the map. Groundwater quality conditions are shown on the water quality classification figure and are classified similar to surface waters. Groundwater quality in the area is classified as GA and GAA. GA groundwaters are designated for use as existing private and potential public water supply, and as base flow to adjacent streams. Quality is generally good and assumed to be suitable for drinking and other domestic use without

treatment. Wastewater discharges to the ground are limited to approved treated domestic sewage. GAA areas are groundwaters contributing to existing public water supply wells, and have the same quality criteria and discharge restrictions as GA. GA designations are areas which may be impaired and not currently meeting standards due to past pollution or land use impacts. The goal is to restore these areas to GA water quality. Although two impaired areas are shown on the map, it is now felt that these areas are not currently impaired. Past pollution sources included failed septic systems which are now sewered, as well as a former wastewater discharge and gasoline spill. These past pollution sources do indicate the potential impacts caused by certain land uses.

## **Potential Water Issues and Considerations**

### **Sewage and Wastewater Disposal**

The site and surrounding areas are served by public sewer. Sewers are clearly needed to support the type and density of the proposed uses, especially considering the poor soil characteristics of the land to support on-site sewage. Adequate capacity appears to exist in the existing sewer service system, and the site is within the proposed service area. Currently the town's sewer allocation with Colchester is approximately 210,000 GPD, and approximately 100,000 GPD are currently used. An estimate of sewer flows from the proposed development is about 40,000 GPD, assuming commercial businesses and essentially dry industry. The attached memo (Figure 8) from the DEP Municipal Facilities section provides a more detailed estimate of the sewage flows. If other industrial type uses are being considered, this could change the sewage estimates significantly. Estimates of industrial uses could range as follows: moderate manufacturing/processing (5,000 GPD/acre); light industry (1500 GPD/acre).

## Water Supply and Water Quantity

The previous ERT report and the preceding groundwater resources section discuss the on-site water supply capabilities. Unless public water supplies are extended from other outside sources, the proposed development will have to rely on-site bedrock wells which would be suitable for relatively small domestic use. The largest community water system in the area is the Eastern Connecticut Regional Water Company (ECRWC), also known as AquaSource. The system consists of two bedrock wells that have yields of between 10 and 20 GPM each. Amounts of water available on-site may be increased by identifying particularly highly fractured areas (see geology section), drilling multiple wells, drilling deep wells, or providing water storage tanks. For this site it would be desirable (from a supply source and system management standpoint) to reduce the proliferation of small public water supplies, and set up a single central water system. If new public water supplies (including all non-community wells such as offices, retail, and business) are proposed in this area they require a certificate of need and convenience from the state DPUC. This would require applicants to examine connections to existing supplies before creating a new public supply. The Southeastern Connecticut Regional Water Utility Coordinating Committee (SEWUCC) has been setup to compile a regional water supply plan in the area including the establishment of exclusive service areas. The ECRWC has been preliminarily designated the service provider for Hebron and currently operates two systems in the area. ECRWC should be contacted as soon as possible regarding water supply alternatives. Clearly a central community water supply system in the town center area is desirable over further proliferation of individual supplies. The estimated sewage flows of 40,000 GPD is a rough estimate of the total water supply needs for this site. It is not expected that ECRWC would currently have an excess of this amount now available. A state Diversion Permit is required if one or more wells joined in one system withdraw more than 50,000 GPD. A major part of the permit process is the assessment of the withdrawal and potential impacts on adjacent supplies and surface water

resources. Based on the current conditions, there is concern that further withdrawals by public and private wells in the upper Raymond Brook basin, combined with the continued export of water out of the watershed via public sewer system and increased impervious surfaces, could begin affect sustainable water supplies in the area. While a simple water budget approach as presented by the town conservation commission provides a gross assessment of the situation, there are many assumptions made and uncertainties concluded. Two additional factors would also have to be considered: (1) bedrock well efficiency and (2) aquifer storage. In bedrock aquifers such as these, it can be assumed that as high as a 1:1 relationship exists between groundwater withdrawals and flow in the streams. Calculations of low flow can be estimated from Connecticut Water Resources Bulletin and made based on the basin size and surficial materials where stream flow records are not kept. If this is done for the Raymond Brook watershed, estimated flows for a 2 year, 30 day low flow (2 year low August flow) would be approximately 2.6 MGD or 3.5 CFS. The question is can a certain amount of water be withdrawn without affecting resources? In order to fully answer this question, the town would have to hire a hydrogeologist to do some exploratory work to determine potential yields and quantify affects to water resources.

## **Groundwater Quality**

Although public sewers will significantly mitigate most wastewater concerns from the development, other non-point sources of pollution from land use should be addressed. Appendix A includes land use risks and rankings, and design standards to protect groundwater quality. As indicated above the site is classified GA and designated as existing private and potential public water supply so essentially the entire site should considered. If a single high yielding community wellfield is developed on site, the well site should be located preferably on a relatively high isolated area of the site. The recharge area should be estimated if possible, and the area reserved for open space or lower intensity

development such as residential. At a minimum, a sanitary radius of 75 to 200 feet (depending on the pumping rate) must be protected under the health code and should preclude all pollution sources. An additional protection radius of 500 feet should be considered where the well recharge area is not known, especially in the up gradient direction. The following basic protection standards should be applied throughout the site -

- No underground fuel or chemical storage tanks or distribution lines, if they must be underground they should be outside well recharge areas and be double walled construction.
- Storage of hazardous material should indoors, or within a roofed structure, with secondary containment. Loading and handling areas should be covered and have spill containment.
- Industrial and heavy commercial uses should have specific material management plans covering inventory, storage, handling, disposal, and emergency response for any hazardous materials.
- Stormwater management systems should be tailored towards preventing pollution by preventing stormwater contact with materials, providing impervious surfaces where releases can occur. Dry wells or leaching structures should not be used for stormwater from paved surfaces in groundwater supply areas. See more on stormwater below.

Concern was raised by the town of the potential impact of this development on the potential large yielding stratified drift aquifer in the Raymond Brook Marsh area. The proposed business expansion site, and the surrounding areas, are all in the upper Raymond brook watershed and would not be in direct recharge area of that aquifer.

## Stormwater Management

Stormwater from urbanization is a significant non-point source of pollution. Management of both the quantity and quality of runoff should be considered to protect receiving waters. While control of stormwater on an individual site needs to be examined, the site's relationship to the overall watershed also needs to be considered regarding overall affect to receiving waters. Certain stormwater discharges which may have potential significant impacts are regulated by the State DEP Water Management Bureau through a state general permit. These include construction activities which disturb 5 acres or more, and certain industrial and commercial activities with high runoff pollution potential. The state program centers on stormwater pollution prevention plans for these uses, however monitoring and end of pipe treatment may also be required. Local land use control, however, will continue to be an important way stormwater is managed.

Given the known nature of the site and potential development types being considered, there are certain guidelines that are recommended. Studies have generally shown that water quality impacts to surface waters begin to show up when watershed impervious coverages approach 15%, between 30-60% impacts can become significant, and >60% can become severe. A number of stormwater documents and guides are available which discuss impact assessment, management options, and design criteria to implement them. Below are some basic stormwater management guidelines.

- **Site Layout and Protection of Sensitive Water Resource Areas:** Site layout and design is important to minimizing impacts and maintaining natural protection of receiving waters. The subdivision of the land, road layout, and individual site plan layout should maintain the natural streambelt system and buffers discussed in the wetlands section, and direct development to the

buildable land areas. This helps maintain the natural drainage patterns and recharge of runoff, and takes advantage of the passive treatment and flood control capacities while minimizing the use and maintenance of structures. With a good site layout many sites may require little more than source controls and passive stormwater controls.

- Source Controls: Pollution prevention measures should be a major practice for commercial/industrial uses. Typical residential use will have minimal and more dispersed pollution sources, such as household waste and lawn maintenance, which are best handled through education.

The following practices should be part of a stormwater pollution prevention plan.

- Insure all wastewater discharges are properly connected and disposed of.
- High potential pollution sources should be located outside wetland/watercourse buffers.
- Prevent stormwater contact with all waste and material storage areas, and divert clean storm water from these areas.
- Hazardous materials should be stored inside a structure with secondary containment.
- Minimize the use of impervious surfaces where possible. Where reduction is difficult, large areas can be broken up into smaller segments with landscaped areas in between to help maintain natural recharge. Because the study site is proposing the use of cluster or flexible zoning techniques this allows flexibility to concentrate development areas thereby reducing road and parking requirements, and maintaining open space around sensitive areas.
- Minimize the application of sodium chloride chemicals as a deicing agent for snow and ice control, and maximize the use of abrasives.



- Only apply chemical fertilizers after soil testing indicates the need. Minimize the use of chemical pesticides, use a licensed applicator in highly landscaped areas, and use non-chemical alternatives where available. The most common problems caused by chemical fertilizers and pesticides is improper handling and application.
- Runoff Treatment and Renovation: Regardless of the extent of source controls, stormwater may pickup and transport pollutants from incidental sources such as litter, vehicle use, lawns, and atmospheric deposition. Contaminants from paved surfaces include suspended solids, hydrocarbons, metals, nutrients, bacteria, road salt, and thermal pollution. Roughly 90% of these contaminants are contained in the first 1 inch of runoff.

This first flush may need treatment depending on the type and intensity of land uses and discharge point. It has been shown that basic separation treatment to remove gross particles and floatables followed by a land surface type of treatment such as vegetated swales, filter strips, or detention basins are effective and protect both surface and ground water quality. Direct infiltration structures such as dry wells or leaching fields can be effective, but care must be taken in groundwater drinking supply areas (not recommended in private or public drinking water supply well areas). For potential types of development, the following general treatment guidelines can be used.

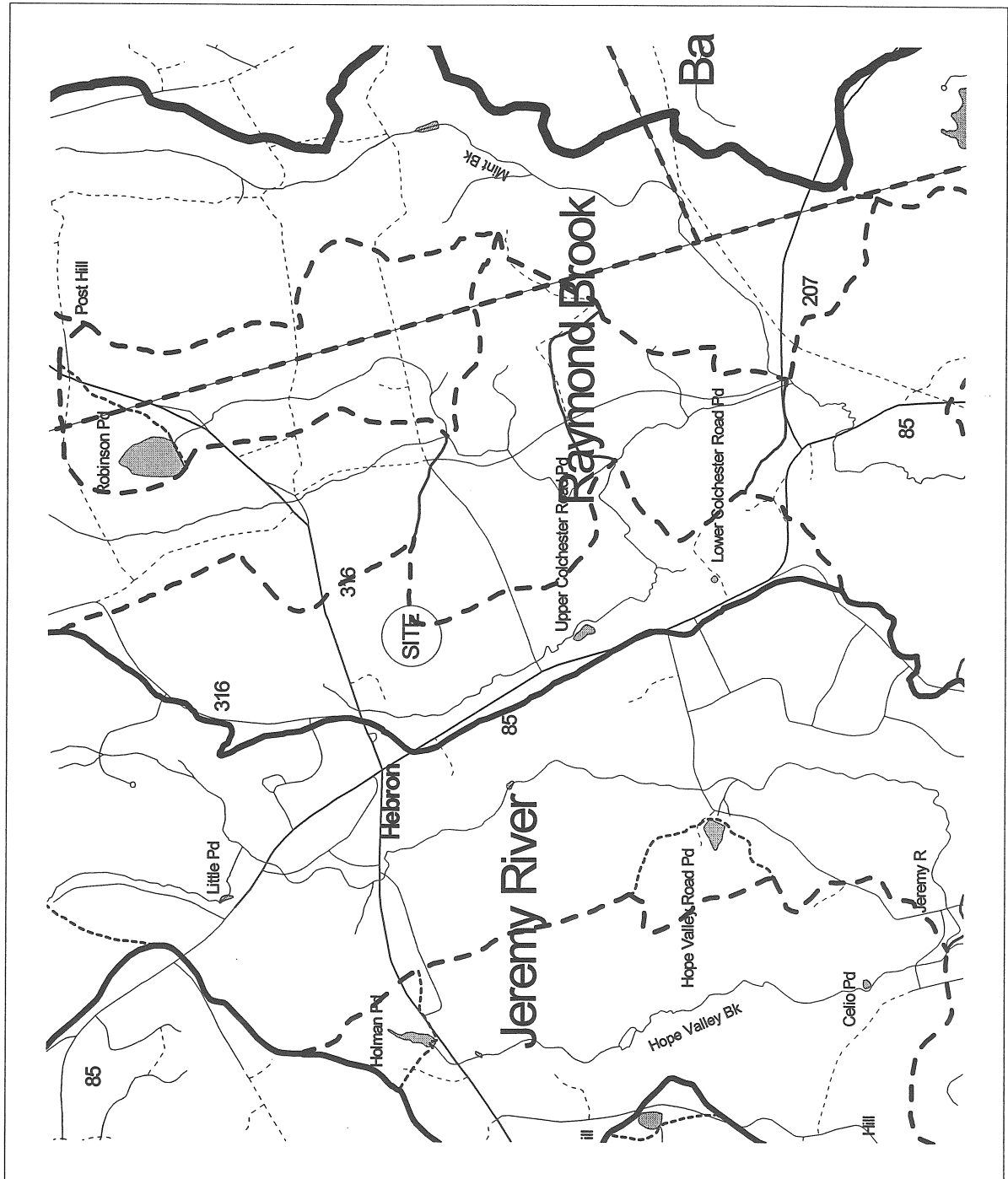
- Small Sites: <1 acre contiguous pavement and <30% impervious coverage, minimize the use of drainage structures, maintain natural drainage ways, encourage sheet flow to natural drainage areas, recharge roof water.
- Large Sites: > 1 acre contiguous pavement, > 30% impervious coverage, high vehicle use, or high materials handling sites. Treatment by diverting first flush to a particle/oil separator which removes heavy sediment and floatables as well as provides emergency spill containment. Lower intensity sites could use hooded (baffled) catch basins instead. Swirl, or concentration type,

separators are the most effective. Discharge of first flush to a vegetated swale, filter strip, or detention basin to promote settling, filtration, and biological uptake. Wet basins and manmade wetlands are the most effective because of better detention and biological activity. Because you are only handling the first inch of runoff, land areas needed are relatively small. Design criteria should generally be for detention times or treatment methods which will remove 80% of suspended material. The attached fact sheet (Appendix A) describes stormwater BMPs, their benefits and efficiencies.

- **Peak Flow Controls:** Runoff flow controls may be necessary to protect downstream flooding or streambank erosion. The overall watershed, the site's location within the watershed, and selected downstream design points (stream culverts, structures, or water bodies) should all be considered when determining the potential affect of individual site runoff on peak flows of the receiving waters. When considering the use of detention measures, the following general guidelines can be used:
  - In the lower 1/3 of the watershed: little or no detention.
  - In the middle 1/3: limited detention.
  - In the upper 1/3: longer detention.

Pre and post development runoff volumes and peak flows should be calculated for each individual site development. This information should then be used to assess its affect on peak flow of the receiving stream and overall watershed. In the case of this site, centralized structural controls or improvements would be desirable. The use of combination structures for treatment and runoff control, and the use of shared stormwater facilities for more than one site, should be encouraged to reduce land area disturbance and structure maintenance.

# Watersheds



Basins  
 Major  
 Regional  
 Subregional  
 Local  
 Stream Reach

Stream  
 Water  
 Lakes

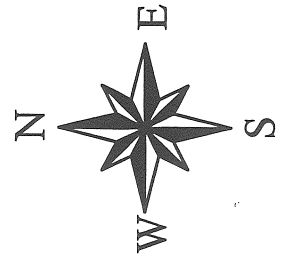
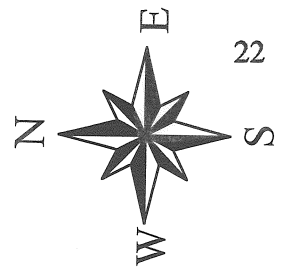


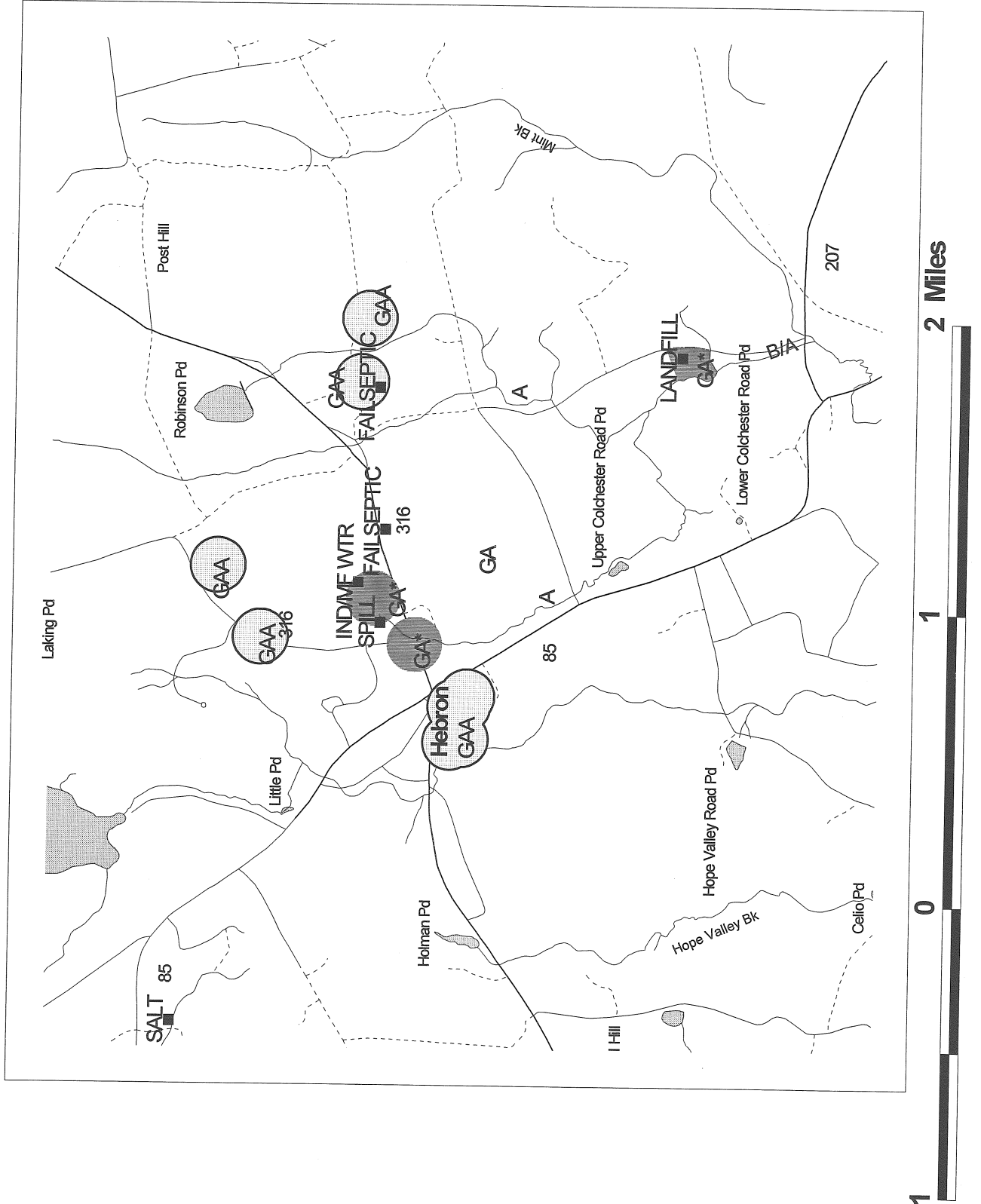
Figure 5.  
 Watersheds

# Water Quality Class. & Pollution Sources

Figure 6.  
Water Quality Classifications and Pollution Sources



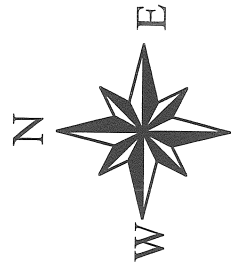
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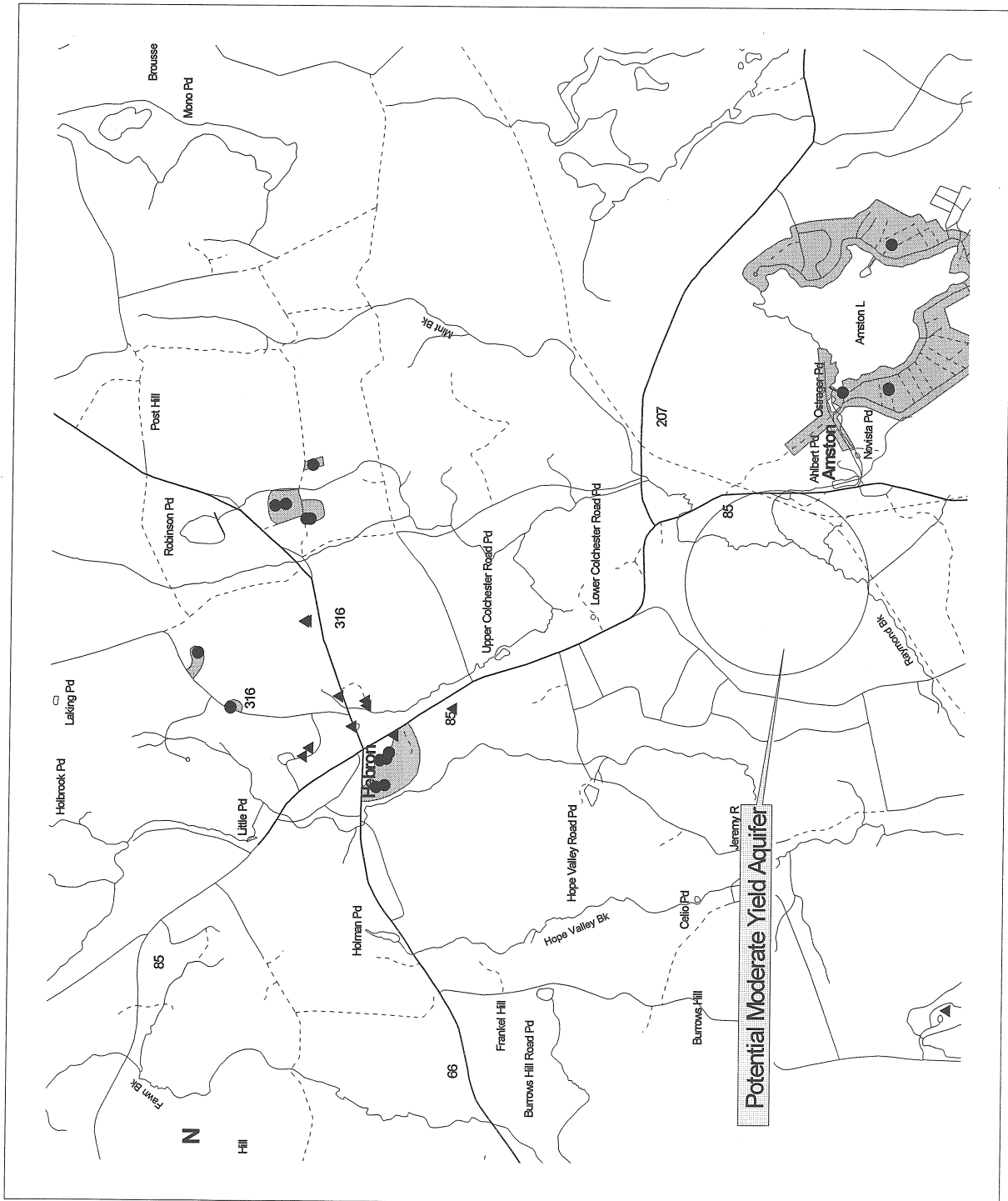
# Water Supply Sources

- ▲ Noncommunity Wells
- Community Wells
- Water Service

Figure 7.  
Water Supply Sources



4 Miles



2

0

2

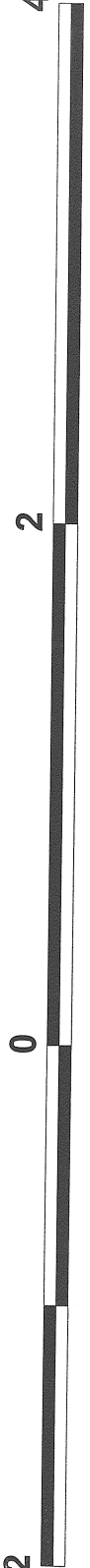



Figure 8.  
DEP Memo

# Memo

**To:** Rob Hust  
**From:** Dennis J. Greci, Supervising Sanitary Engineer   
**CC:**  
**Date:** 01/31/00  
**Re:** ERT for Hebron Center Business District

Rob,

I was at first concerned with the absence of input from the WPCA. Since one of the main reasons for re-evaluating this area is the presence of sewers, whose absence prevented such an evaluation from having any real meaning in the past, it would seem appropriate to first review the sewer service area maps and the related local ordinances / regulations. It is my understanding that WPCA (Denise Alexander) was invited on the walk-over, but had to decline due to a scheduling conflict.

After talking with Denise, it is clear that this area is within the town's adopted sewer service district. There is capacity within the town's existing sewerage allocation of roughly 210,000 gpd (per contract with Colchester) to handle the buildout of this area:

Residences: approx 110 @ 200 gpd/household	=	22,000 gpd
Businesses: approx 35 @ 10 employees x 15 gpe	=	5,250 gpd
Retail: approx 20, assume ½ food service		
10 @ 8 employees x 15 gpd/employee	=	1,200 gpd
10 @ 200 customers x 5 gpd/customer	=	10,000 gpd
Total estimated flow	=	38,450 gpd, say 40,000 gpd

The town is currently using approx 100,000 gpd of their capacity, with no significant new development planned, so there would seem to be sufficient contractual capacity for the additional flow. Technically, the sewers are designed to handle substantially more than the contractual limits.

The plan seems to carefully avoid environmentally sensitive areas (wetlands, etc); as long as that separation is maintained, the restrictive conditions in the grant will not come into play here.

# Soil and Water Conservation District Review

## Existing Business District

There is a lot of baseline information regarding the existing Central Business District (CBD) in the previous ERT completed in 1984. Basic information such as soil type has not changed and may be referenced in the previous report.

A number of physical limitations to further development of the Central Business District were identified in the original report. One of the limitations identified was the high water table, which restricted sites for on-site sewage disposal. Now that sewer serves the area, this limitation has been removed. However, most of the easily developable area within the CBD has been developed already. The remaining area has substantial limitations, as described below.

Since 1984 additional development has occurred on the north side of Route 66. Some of this development occurred within wetlands and the most recent construction underway at the Post Office required wetland filling. From the Post Office east along Route 66 there is a contiguous wetland area limiting future expansion northward. According to the Soil Survey of Tolland County (SCS 1963) and other sources (Figure 9), there is a small area of upland north of the wetland. However, access to the parcel would require extensive alterations to the wetland.

Based on the Town of Hebron "Draft Plan of Conservation and Development", dated September 24, 1999, over two thirds of the existing General Business District has been developed. Of the remaining area, nearly half is wetland, and slightly less than a third has steep slopes. The remaining area is approximately 28 acres and this includes the large parcel south of Route 66.

According to a number of sources, there are already problems with stormwater on the north side of Route 66. Insufficient capacity in the private drainage system and an under-sized culvert under Route 66 cause localized flooding. The town is considering a drainage study of the area to analyze the stormwater system. The study is necessary to identify required improvements to the existing system and to prevent future development from exacerbating drainage problems.

Based on the information available, further development of the north side of Route 66 is extremely limited and would require additional impacts to wetlands or extensive grading. In addition, improvements to the existing stormwater conveyance system would be required.

To accommodate future growth, the town is planning ahead and has identified a potential expansion area south of Route 66. The following comments pertain to the parcel identified for potential expansion of the Business District.

## **Proposed Business District** **Expansion Area**

### **Soils**

Traditional land use on the parcel has been predominantly agricultural, with less suitable areas remaining in woodland. The site contains a number of soils listed by the USDA as Prime Farmland Soils in Connecticut. Prime Farmland Soils are shown on Figure 10.



Many of the soil limitations discussed in the previous ERT report for the existing business district are relevant to the proposed CBD expansion area, as a number of the soils are found at both sites. Limitations are generally due to a seasonable high water table and/or low permeability. However, since town sewer now serves the area, on-site disposal is not an issue.

The predominant upland soils on the site are part of the Woodbridge, Charlton, and Paxton Series. Soils from the Gloucester, Hollis, and Swanton series are found over smaller areas. The upland series are described below. Individual soil descriptions are in Appendix B, with their map symbol from the Soil Survey of Tolland County Connecticut.

- **Woodbridge:** These are moderately well drained soils with a hardpan between 20-30 inches. The erosion hazard is moderate. Permeability of the substratum is slow to very slow. These soils have a seasonal and temporary perched water table at around 18 inches.
- **Charlton:** These are deep well-drained soils with a medium erosion hazard. Textures range from a fine sandy loam to stony fine sandy loams. The less stony soils are very desirable for agriculture. Limitations for development are few.
- **Paxton:** These are well-drained soils with a hardpan at 18-30 inches. Permeability in the substratum is slow to very slow. Run-off is rapid and the erosion hazard high.
- **Gloucester:** These are excessively drained soils with rapid permeability. The area mapped on this parcel is a mix of Gloucester and Charlton soils. The only limitation is stoniness. The erosion hazard is low to medium.

- **Hollis:** These are shallow soils over bedrock. They are moderately permeable. The most common limitation is stoniness and shallow depth to bedrock. Their erosion hazard is low to medium.
- **Sutton:** These are moderately well drained soils with a seasonal high water table at a depth of approximately 18 inches. The erosion hazard is low to medium.

Limitations for each soil are described in Appendix B. The main limitation of the upland soils is the high water table. These soils can support both roads and structures. However, the roads will require underdrains and structures will require foundation drains. For residential development, lawn areas associated with both the Sutton and Woodbury soils will typically be soggy in the spring and for a few days after rains.

The high water table and slow permeability of the soils also has implications for stormwater issues, discussed below.

## **Wetlands**

Wetlands comprise approximately 1/3 of the site. The largest system is in western section of the property and is associated with a tributary of Raymond Stream. In the approximate middle of the property there is a wetland that forms the headwater to another small tributary to Raymond Stream. The easternmost portion drains directly to Raymond Brook.

A detailed inspection of the wetlands was not conducted due to snow cover. Based on their position in the landscape, the on-site wetlands have hydrologic support functions related to Raymond Brook, and have some functionality for

water quality maintenance. The value of this function may increase as a result of development, as some of the wetland areas may be appropriate for passive water quality treatment.

Since the project is the planning stages and is being prepared with town support, it's assumed that wetland alterations will be avoided where possible. Generally, direct impacts to wetlands should be limited to the two road crossings. The current "Conceptual Plan for Development" shows a number unnecessary and avoidable impacts with proposed residential development on the east side of the parcel. Presumably, these impacts have feasible and prudent alternatives as defined in the State of Connecticut Inland Wetlands and Watercourses.

The road crossings and bike trails through the wetlands can be done with minimal disturbance. Standard culvert crossings can be accomplished with only temporary impacts to streams and wetlands, provided that adequate erosion controls are used. With a development of this scope, wildlife habitat associated with both the uplands and wetlands will be compromised. Maintaining adequate buffers around wetlands will help preserve some of the habitat value associated with these areas.

As a planned development with town support, it should be a model project in terms of avoiding impacts to wetlands and other natural resources.

## **Erosion Control**

Both the Woodbridge and Sutton Soils have seasonal high water table and may be difficult to manage for erosion control from late fall through early spring. When disturbed, these soils seep and runoff is increased. When an erosion plan is prepared for development of these soils the following measures will be critical: careful project phasing to reduce the extent of soil disturbance, limiting

disturbance of soils from late fall to early spring, and the use of temporary stabilization methods such as mulches and temporary vegetation.

The Paxton soils have a hardpan at 18 - 30 inches and are highly erodible. The measures listed above should also be used during development of these soils. The project will be subject to DEP's "General Permit for the Discharge of Stormwater ... for Construction Activities." The General Permit requires measures such as sediment basins for areas of disturbance exceeding 2 acres. The erosion control plans submitted for town review should show all of the provisions required, since some of the measures require pre-development site work.

Slopes on the parcel are gentle to moderate. There is a small area of steep slopes in the southeast section of the parcel.

Except for areas with difficult soils, standard erosion control measures should be sufficient for this site. Since some of the development may occur in large blocks, it's worth noting that perimeter controls such as silt fence should generally not be used for areas of more than one (1) acre of disturbance without other control measures. Temporary mulches, seeding, erosion control blankets, and vegetated filters should be used to protect large areas of disturbed soil.

The District is available to review individual site plans once they are developed.

## **Stormwater Management**

A number of stormwater issues were raised in the previous ERT, including erosion of the western stream channel in the vicinity of Pendleton Village. According to the town wetland agent, the stream has stabilized over time and there is little active channel erosion. The stretch of Raymond Brook east of the site has a number of undercut banks. According to the wetland agent, the banks

are relatively stable and have not shown any marked change in the rate of erosion.

The current "Conceptual Plan for Development" shows a relatively dense mix of commercial and residential development with an interconnecting network of roads. The dense development is consistent with the "town center" concept. However, measures should be taken to reduce the impact of increasing impervious surfaces. These impacts are well documented and include increases in peak flows and degradation of water quality. The site is within the watersheds of Raymond Brook and the Jeremy River.

A stormwater management plan should be developed to address both issues. Most towns have a general policy of not allowing any off-site increase in peak flows. However, any analysis of site hydrology should include the timing of the peak flow of the receiving watercourses, to insure that the peaks do not coincide. Detention is the usual remedy to prevent increases in the peak flows. With three sub-drainage basins on this parcel, more than one detention structure will be necessary. Increasingly, detention basins are used to both reduce peak flows and improve water quality. There are a number of advanced design techniques that can be used to create dual detention/treatment systems. The current state-of-the-art can be found in the manual "Design of Stormwater Wetland Systems", by Thomas R. Schueler.

There are a number of alternative construction methods available to reduce the amount of impervious area and increase infiltration. Use of these methods may be somewhat limited on this site because many of the soils have slow permeabilities. The Woodbridge, Sutton, and Paxton soils are all limited in this regard. The Charlton and Gloucester soils, which are found on the east side of the parcel, should accommodate infiltration systems. Due to the limitations of the soil mapping, on-site investigations of soil capacity are necessary before ruling any area out for such methods. Some of the more common methods

include infiltrators for stormwater, alternative paving materials, "rain gardens" for roof run-off, and vegetated infiltration basins for stormwater.

Treatment of stormwater within areas of problem soils will be limited to in-line methods such as sediment control structures, and surface treatment like wet basins and bio-retention areas. There are a number of new sediment control structures that offer increased removal of solids. The District can provide additional literature on a variety of stormwater treatment options if the town would like more information.

A member of the Conservation Commission has raised concerns about lowering the base flow of on-site streams. This is a possible result of increasing impervious surfaces and developing on-site wells. In addition, with sewer service, water will not be returned to as groundwater via on-site septic systems. There are a number of groundwater modeling programs available to aid in the development of a water budget for the site. The issue warrants further investigation.

Figure 9.

↑↑

# Soils Map

Scale 1" = 1320'

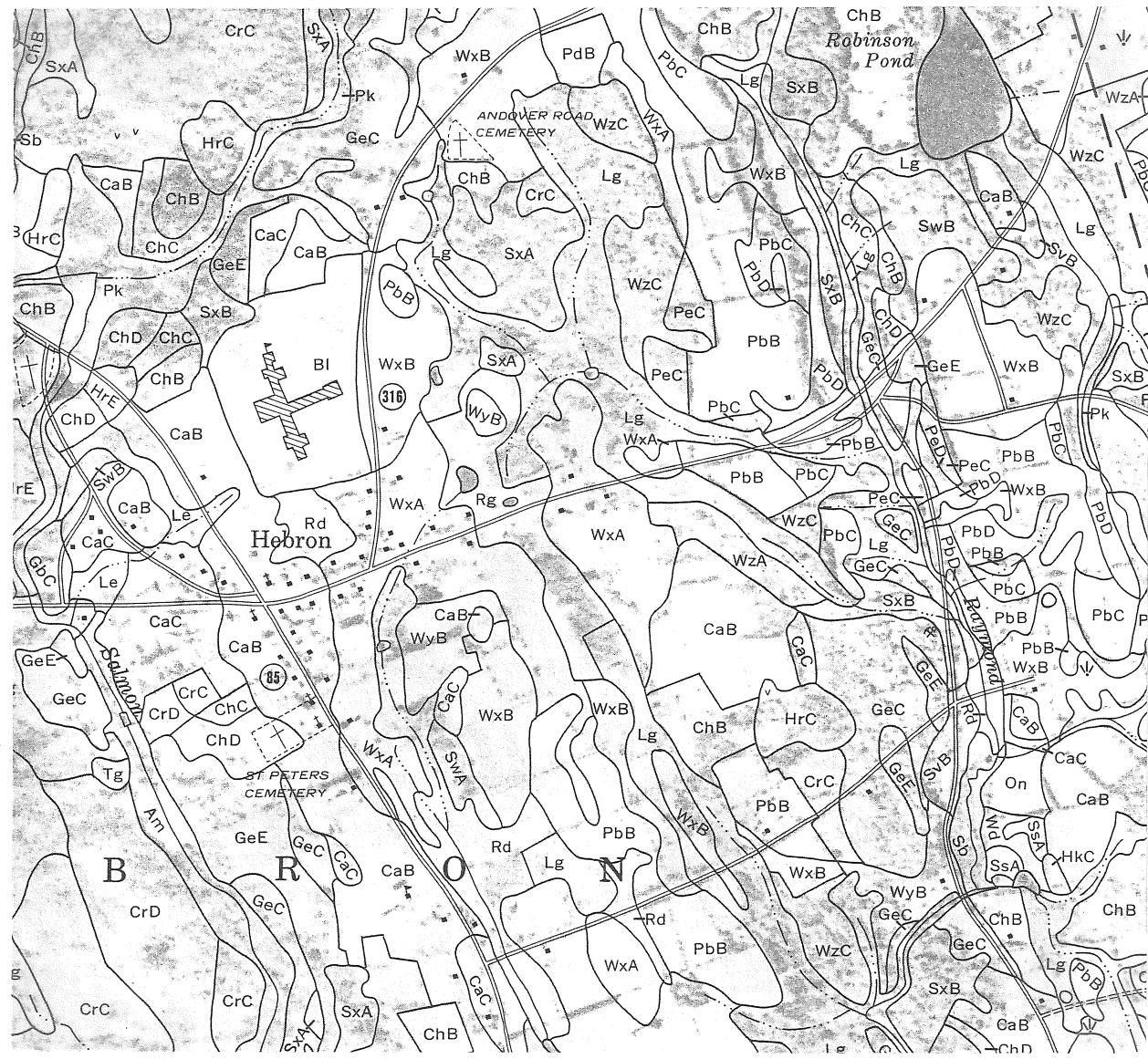
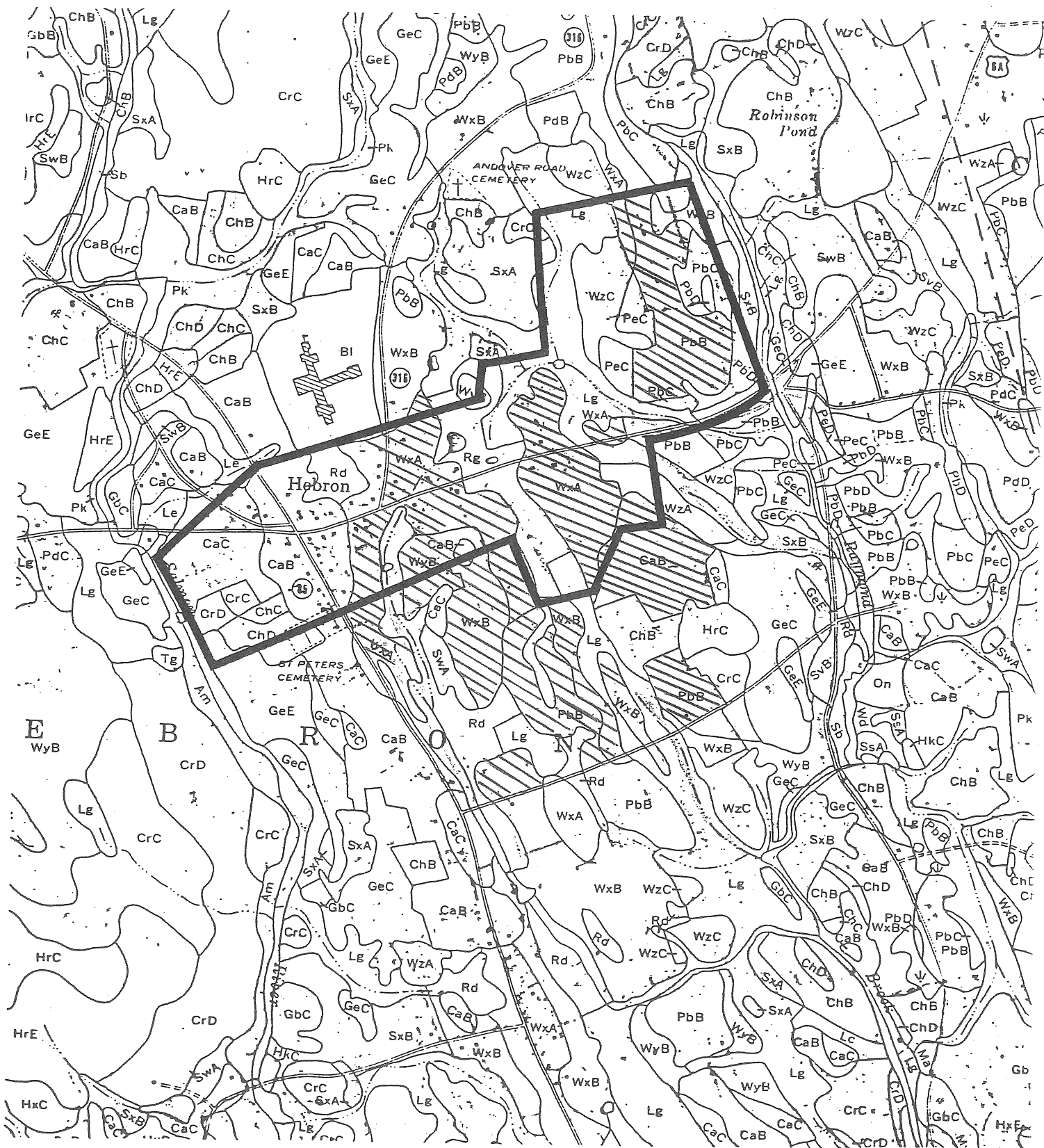


Figure 10.

Prime Farmland Soils

Scale 1" = 1320'





# Stormwater Management Review

This review of stormwater is necessarily limited to the information available at the time of the ERT. The town has stated that a comprehensive hydrologic study of the area under discussion will be completed in conjunction with the town moving forward on special zoning for this area. Such a study is highly recommended by this Team, and will allow the town to develop a specific plan to address current flooding and water quality problems and to address future detention and treatment issues. It should include a determination of how much retention is optimal for the proposed business district area, as well as a review of methods for alleviating existing drainage problems from the Hebron Plaza.

The 1984 ERT report concentrated on water quality impacts from increased water quantity due to development. The additional flows are a significant potential source of pollution due to erosion and flooding, but in addition, today's commissions must also consider impacts of sediments, nutrients, bacteria and heavy metals that accompany increases in development and stormwater runoff. The streambank erosion noted in the 1984 ERT report continues, both in Raymond Brook and the unnamed tributary, and needs to be addressed. Any future development will need to incorporate detention to prevent increases in erosion. Adjustment of the timing of peak flows from any particular parcel should be based upon the results of the hydrologic study. It should be noted that the recommendation in the 1984 report is to use the existing wetlands to treat runoff on the site. Current practice and regulation do not allow for natural wetlands to be used for stormwater treatment, and it does not appear that the wetlands have any further storage capacity, based upon current flooding problems. This should be verified by the hydrologic study.

In any future development or work that impacts the existing drainage system, best management practices to treat water quality as well as quantity must be considered. These might include items such as the use of catch basins with deep sumps and hoods, velocity dissipation devices at all outlets, elimination of curbs or installation of level spreaders to encourage sheet flow, complete stabilization of all slopes and stream banks after any construction, and advanced treatment systems wherever feasible and/ or required. Such systems include, in order of preference, wetland treatment systems, extended basin systems with sediment traps at the inlets, sediment basins, and in-ground devices, preferably incorporating swirl concentrator technology. This is not a comprehensive list of available management practices, but is provided to enable the town to begin considering available options. The proposed business district area should be designed to allow the inclusion of water quality basins, and planning for these in advance will help to ensure that potential hydrologic and water quality impacts to Raymond Brook are considered.

The town should also prepare a program to maintain all drainage system and treatment structures, including catch basins, outlets, basins and chambers. The town should also consider a public education program to inform commercial and industrial sites of practices such as dumpster coverage and indoor storage wherever possible, as well as the need for spill plans and catch basin protection. In residential areas, the public should be educated on fertilizer and pesticide use, as well as control of animal waste and household products. Using local groups such as scout troops or school groups for projects such as catch basin stenciling and public outreach is an excellent and inexpensive method of implementing such programs.

Any construction project that involves the disturbance of over five acres will require Connecticut's General Permit for the Discharge of Stormwater and Dewatering Wastewaters (the "Permit"). The permit requires that the site register

with the Department of Environmental Protection (CTDEP) at least 30 days before the start of construction. The registrant must also prepare, submit and keep on site during the construction project a Stormwater Pollution Control Plan (the "Plan").

The Plan must include a site map as described in Section 6(b)(6)(A) of the General Permit and a copy of the erosion and sedimentation (E & S) control plan for the site. The E & S plan that has been approved by the Town in conjunction with the CT DEP Inland Water Resources Division (IWRD) and the local Soil and Water Conservation District may be included in the Plan. The plan and site map must include specifics on controls that will be used during each phase of construction, pursuant to permit Section 6(b)(6)(B). Specific site maps and controls must be described in the Plan, as well as construction details for each control used. The permit requires that "the plan shall ensure and demonstrate compliance with the Connecticut Guidelines for Soil Erosion and Sediment Control (the "guidelines")." The Plan must be flexible to account for adjustment of controls as necessary in to meet field conditions.

The Plan must demonstrate that the post-construction stormwater treatment system has been designed with a goal of 80% removal of total suspended solids, pursuant to General Permit Section 6(b)(6)(C)(iii)1), and velocity dissipation devices at all outlets.

# Wetland Review

The Hebron Conservation Commission is interested in information that will provide an update to existing studies of the area as it pertains to inland wetlands and watercourses.

The existing studies include a 12/84 ERT report for what is known as the "Central Business District" as well as A Natural Resource Inventory Project Report for Hebron, Connecticut ("NRI") dated 9/89, prepared by the Connecticut River Watershed Council. The NRI was a general town-wide inventory with a section devoted to wetlands. Their inventory of wetlands was based on Hebron's Town Wetland Map which was assembled by identifying poorly drained, very poorly drained and alluvial/floodplain soil map units as designated by the National Cooperative Soil Survey of the USDA Natural Resource Conservation Service (NRCS). The study also reviews the many functions and values of these wetlands and watercourses conveniently dividing them up into physical, biological and cultural categories. This information will not be repeated here.

The NRI then listed several significant wetlands. Located "downstream" in the same watershed that occupies a majority of the study area, the NRI identified the "Raymond Brook Marshes" as a "wetland with known significance for fish and wildlife" due to its inclusion in DEP's "Wetlands of Special Concern in Connecticut" (3/88). In speaking with personnel from our Environmental and Geographic Information Center, this wetland complex remains a wetland of special concern due to its role in affording valuable habitat for salmon.

Please refer to the accompanying map for updated wetland soils information of the study area (Figure 11). This information was taken from the more recently developed Connecticut Soil Survey Database digital mapping project produced by the DEP and the USDA-NRCS soils cooperative. Two areas of designated

wetlands on the map were omitted as a result of photo-inspection by the Team wetland specialist and have not been verified in the field. More detailed, on-the-ground, lot specific, wetlands mapping will need to be done prior to any development within the study area.

Based on comparisons of 1980 and 1995 aerial photographs it does not appear that there has been substantial growth of developed areas within the central business district within that time span. Two areas of planned development that would significantly alter the landscape of this and surrounding areas were presented to the ERT team. This includes an area described as a 160 +/- acre "business expansion area" to the south of the existing town center of which a conceptual plan was included as well as an area to the north of the Town Center with no specific plans for development presented. Both of these potential development areas exist within the Raymond Brook Watershed among wetlands and watercourses that drain to Raymond Brook marshes previously described as "wetlands of special concern" by the DEP. As such, any development of this subject area should receive special scrutiny during any wetland permit review process with this critical habitat in mind.

The wetlands within the subject area are contiguous and are drained by small watercourses. They have been significantly altered in the past by agricultural practices, as well as commercial and residential development. As a result, the vegetative cover type varies greatly, with the predominant type being deciduous forest, with some scrub/shrub cover and limited wet meadow in areas where the forest cover has been removed and/or repressed by the maintenance of crop land. All of the wetlands in the subject area are of the Ridgebury / Leicester soil types. These poorly drained soils typically developed on glacial till deposits consisting of schist, gneiss and granite.

The wetlands essentially exist in two linear configurations flowing from north to south through the study area. North of Route 66, near the top of the Raymond

Brook watershed, prior to encountering the commercial establishments of the Town Center, is where the wetlands appear to be least disturbed by cultural activities. The two wetland corridors disappear as they meet with the relatively narrow strip of development at the Town Center and then resume south of the center. South of Rte. 66, the wetlands have been substantially altered by pervasive agricultural activities and one residential lot.

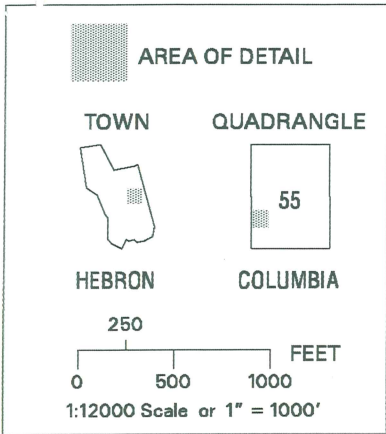
Due to the fact that these wetlands exist upstream of the Raymond Brook marshes which are of special concern because of their role in providing critical salmon habitat, maintaining their ability to improve water quality and maintain water quantities should be of prime consideration. Wetlands have been shown to naturally improve the quality of the water that enters them from developed up-slope areas. They are also effective at metering out and providing a prolonged flow of water, enhancing contributions to their associated watercourses during periods of drought.

Therefore, it is advised that any development within this study area cause minimal impacts to existing wetlands and watercourses and, ideally, incorporate restoration of previously impacted wetland areas. In addition, preservation of a suitable upland buffer adjacent to the wetlands is recommended. This type of setback has been proven to "buffer" the negative effects that upland development activities may have on wetlands. The width of this buffer area can vary according to its intended purpose, as well as the surrounding soil types, slopes and vegetation, however, a buffer of 75 to 100 feet has been shown to be satisfactory to prevent erosion and sedimentation and maintain water quality.

It is evident that the plan for the expanded business district not only proposes several areas of direct impacts (filling) to wetland areas as mapped on the conceptual plan, but also severely encroaches upon the upland buffers recommended above. The wetland areas indicated appear to have been transferred from the Town Wetland Map and therefore may significantly change,

perhaps increasing the amount of impact, once more detailed wetland mapping is conducted. It is strongly recommended that more attention be made to preserving existing wetland areas as well as maintaining an adequate amount of upland buffers to provide additional protection to these valuable resources. In addition, it is advised that areas of previously impacted wetlands be identified for wetland restoration opportunities.

Finally, it is recommended that a state-of-the-art stormwater management plan be instituted for the expanded business district. Principals to be followed should include minimizing impervious areas, using sheet flow deposition of stormwater runoff collected from impervious areas whenever practical, and treating "point" discharges of stormwater with innovative techniques such as pre-treatment wetlands, vegetated filter strips and grit-oil separators.



**DEP-GIS** *Wetland Soils* **HEBRON TOWN CENTER** 42

**LEGEND**

- ALLUVIAL AND FLOODPLAIN SOILS
- NON-WETLAND SOILS
- POORLY DRAINED AND VERY POORLY DRAINED SOILS
- WATER
- Photo-revised non-wetland

*Watershed Boundary*

**Figure 11.**  
**Wetland Soils**

SOILS, SOIL SPECIAL FEATURES - Soil map units and soil special features from the Advance Connecticut Soil Survey Database, 1:12000 scale data. Soils mapping and digital data was produced under the Connecticut Department of Environmental Protection / Natural Resources Conservation Service soils cooperative. This information is being provided as "ADVANCE INFORMATION SUBJECT TO CHANGE". This data has NOT been certified by Natural Resources Conservation Service as meeting all SSURGO (State Geographic Soil Survey Database) standards.

PLOTTED: 03/03/00 11.12.40 GIS

Natural Resources Center, Connecticut DEP





# The Natural Diversity Data Base

The Natural Diversity Data Base maps and files regarding the project area have been reviewed. According to our information, there are no known extant populations of Federal or State Endangered, Threatened or Special Concern Species that occur at the site in question.

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 Environmental & Geographic Information 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. Consultations 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.

It is now possible for you to conduct an initial endangered species review using the "State and Federal Listed Species and Significant Natural Communities" maps available for viewing through each town's Town Hall. The Town Planner should have a copy of the map and instructions on how to use the maps. This map shows the generalized locations for listed species and communities as gray-shaded areas on a 1:24,000 scale map of the town.

# Vegetation

This review addresses only the vegetation on the ±160 acres being considered as the possible business expansion area. The vegetation present on this acreage falls into five (5) broad vegetation cover types. These are Open (agricultural) Field, Old Field, Mixed Hardwoods, Conifer Plantation, and Open Swamp. The approximate locations of the vegetation cover types have been delineated on the Vegetation Map (Figure 12).

The Open (agricultural) Field type (Type A) and associated hedgerows totaling approximately 66 acres is the predominant vegetative cover. These nineteen fields are a mixture of tilled, hay, mowed and pastured fields. They vary in size from 1 acre to 16 acres. These open fields are grass or corn stubble with winter cover. All have had some agricultural activity performed within the past two to three years.

The included hedgerows, typically less than 50 feet in width, are a mixture of sugar maple, white ash, black oak, white oak, aspen, choke cherry, hickory, sassafras, crabapple and eastern red cedar sapling, pole and sawtimber-sized trees. Many of the largest trees on this site were within these hedgerows. A shrub layer, frequently on the field edge, is comprised of alder, juniper, multiflora rose\*, Japanese barberry\* and autumn olive\*. Climbing vines of poison ivy, wild grape and Japanese bittersweet\* were noted during the field work.

The Old Field type (Type B) of approximately 41 acres is comprised of areas disturbed during previous site development work, former agricultural fields that are no longer maintained and former orchards invaded by trees and shrubs. Two narrow riparian zones (one permanent flow, one seasonal flow) near Kinney Road are included within this type. These old fields are being colonized by

individual and small groupings or "islands" of seedling to pole-sized red maple, eastern red cedar, eastern white pine, choke cherry, white ash and crabapple and shrubs such as alder, autumn olive\*, multiflora rose\*, winterberry and highbush blueberry. Pole to sawtimber-sized red maple, hickory, white ash and choke cherry are found in the hedgerows included within this type. Native and cultivated grasses form the ground cover together with other herbs, mosses and bracken ferns. Wild grape and Japanese bittersweet\* are climbing over many of the old fruit trees in the former orchards. In the area along Kinney Road, a dense understory of multiflora rose\* and Japanese barberry\* has developed making walking through the area difficult at best.

The Mixed Hardwoods type (Type C) covers approximately 58 acres and may be further separated into five sub-types due to differences in tree size, tree species composition and growing site conditions.

Occupying approximately 24 acres, Type C-1 is a sawtimber/pole stand of sugar maple, white ash, red maple, black oak, black gum, tulip poplar and hickory. Sapling-sized sugar maple and red maple form the understory. An open shrub layer of viburnums is present over a light ground cover of ferns. This high quality growing site is fully stocked with high quality trees.

Type C-2 is a former Christmas tree plantation of approximately 4 acres now overtopped by mixed hardwoods. The overstory is comprised of sapling and pole-sized white ash, red maple, black oak and tulip poplar with an understory of white spruce and hardwood saplings. A shrub layer of highbush blueberry, viburnum and alder exists. The ground cover is various species of mosses. The site quality is medium to high and the stand is fully stocked to overstocked with quality trees.

A fully stocked Mixed Hardwoods stand, Type C-3 covers approximately 3.3 acres. It has a pole to sawtimber-sized overstory of red maple, elm, white ash, cherry

and sugar maple. The understory consists of red maple and elm saplings and poles. Alder, highbush blueberry and viburnums form a moderate shrub layer with a ground cover of ferns, grasses and mosses. Tree quality is fair and site quality is medium on this moist to wet soils.

Occupying a wet growing site with an intermittent stream, Type C-4 is approximately 15 acres. It is fully stocked to overstocked with trees. The overstory consists of pole to sawtimber-sized red maple, elm, white ash, yellow birch and black gum. White oak, black oak, hickory, sassafras, aspen and beech occur along the edges and on the slightly higher ground within this stand. Red maple, elm and beech saplings form the understory. The ground cover is sedges, ferns, grasses, mosses and princess pine under a shrub layer of alder, highbush blueberry and viburnums. Tree quality is fair to good on this low to medium quality growing site.

Type C-5 is approximately 12 acres of Mixed Hardwoods growing on a drier site. The overstory is pole to sawtimber-sized black oak, hickory, white oak, red maple, sugar maple and white ash. Sapling to pole-sized black locust, hickory, black oak, white oak, white ash and red maple are in the understory. A moderately dense to dense shrub layer of multiflora rose\* and Japanese barberry\* exists. The ground cover is ferns and grasses. This medium quality growing site is fully stocked with fair to good quality trees.

The Conifer Plantation (Type D) occupies approximately 1 acre. The stand is fully stocked with pole to sawtimber-sized white pine, larch and red pine. The understory and shrub layer is open with a few hardwood and softwood seedlings and saplings and blueberry or huckleberry bushes occurring. The ground cover is grasses and conifer needles. The quality of the growing site is medium. Tree quality is poor to fair due to forked and multiple stems.

An Open Swamp and associated riparian zone (Type E) of approximately 4 acres was created when beaver dammed the stream. Flooding killed off the hardwoods and formed a swamp that is variably stocked with a light to moderate shrub layer of alder, willow and multiflora rose\* over sedges and bunch grasses.

*\* Invasive exotic vegetation has become established on many parts of the review site, especially in open areas or areas open in the more recent past. Of special concern are several invasive plant species which have the potential to become major components of the ecosystem by out competing native species. These include autumn olive, Japanese barberry, Japanese bittersweet and multiflora rose. Although some of these species provide wildlife with food and cover, they are aggressive competitors with native plant species. In some areas, the presence of one or more of these exotic species may preclude the establishment of the more desirable native plant species. Mechanical removal and/or chemical control of these plants may be effective but will become more difficult and more costly as they become more widespread.*

## **Concerns**

The impact of development of the review site would be to remove additional land from open space and forest land from the potential production of forest products. Development of the site as depicted in the *Conceptual Plan of Development* by Diversified Technology Consultants, April 12, 1999 would preclude long term forest management. Tree removal and vegetation clearing would take place on a significant portion of the site. Therefore, careful selection of the trees to be retained as well as their protection during construction will be necessary.

Ideally, trees that are to be retained should be healthy, long lived species which are free of damage or defect. Species such as the oaks, hickories, white ash, sugar maple and white pine are suitable. These trees may be left in groups or "islands"

to reduce the impact of soil disturbance and mechanical injury during clearing and construction. Construction activities that occur too close to trees that are to be retained will adversely affect their health, vigor and longevity; and potentially create future hazard trees. Trees are very sensitive to the condition of the soil within the entire area of their root systems. Excavation, filling and the general use of heavy equipment will lead to some degree of soil compaction that can adversely affect the soil moisture and aeration balance. This imbalance could lead to a decline in tree health and vigor and could possibly lead to tree mortality in three to five years. Physical damage to the root system (by excavation) or bark damage will allow the introduction of decay organisms which may result in the decline of a tree's health over time. Individual trees, "islands" of trees, and buffer zones can be designated for retention with vinyl flagging or fencing prior to construction so that tree injury may be avoided. No excavation, filling or operating of heavy equipment should be permitted within 25-50 feet (depending on tree diameter - the larger the tree to be retained, the greater the area of no disturbance) of single trees or groups of trees. A general rule to follow is no excavation, filling or heavy equipment should be permitted within two times the radial spread distance of the tree's crown.

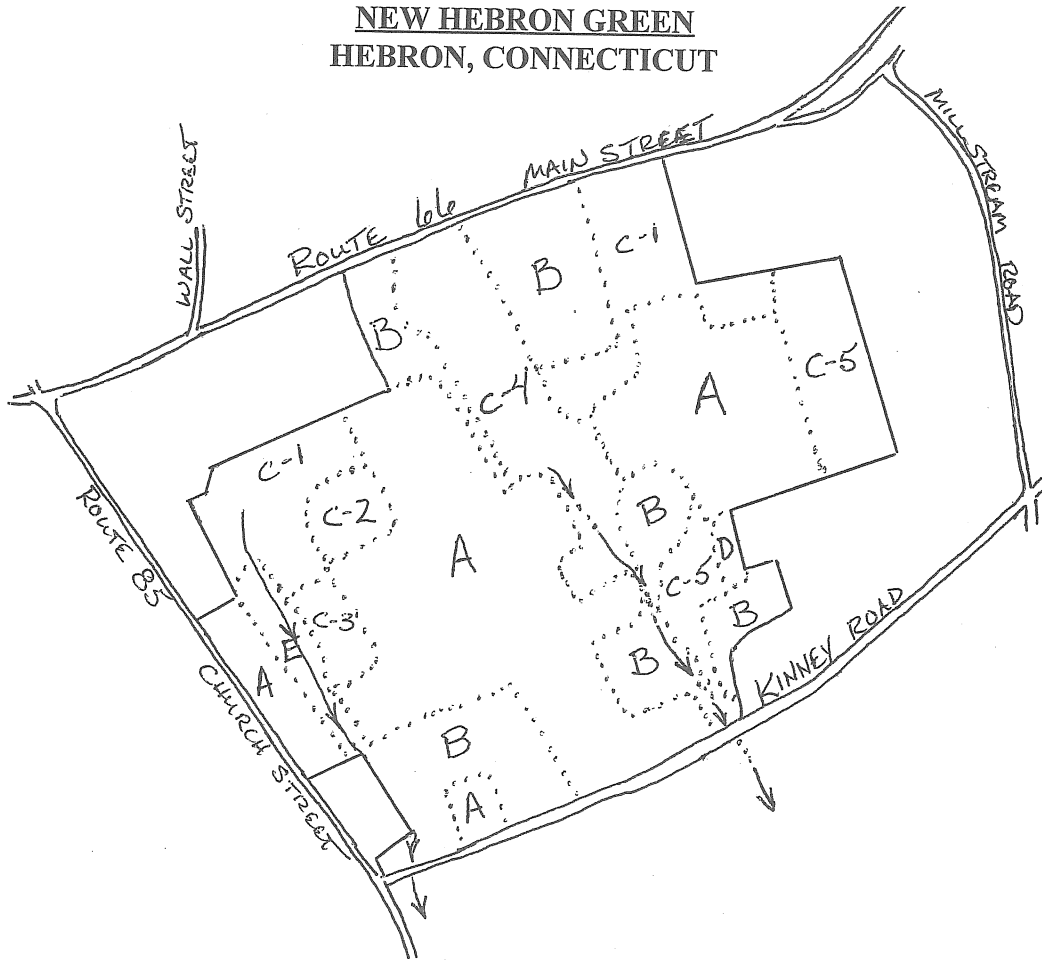
Plantings of native conifer trees, hardwood trees and shrubs should be made after final grading has been completed. A variety of species suited to each site should be planted to avoid creating a monoculture with its potential for tree losses due to insect or disease outbreaks. During the planning process, locations for street tree plantings should be mapped out and suitable species chosen for each site.

It is doubtful that any system of forest management would be a viable long term economic use for this site given the land values. The other amenities of trees and forests must be considered. Trees and forests have value in reducing climatic extremes, controlling runoff, filtering pollutants from the air and water, reducing noise, providing aesthetic enjoyment, creating wildlife habitat,

recharging aquifers, supplying wood fiber and functioning as a carbon sink. Therefore a good relationship between development and the retention of forested open space is essential if generations to come are to enjoy a high quality of life.

Figure 12.  
Vegetation Type Map

NEW HEBRON GREEN  
HEBRON, CONNECTICUT



VEGETATION TYPES

- A. OPEN FIELD ..... 66=- ACRES
- B. OLD FIELD ..... 41=- ACRES
- C(1-5). MIXED HARDWOODS .. 58=- ACRES
- D. CONIFER PLANTATION ..... 1=- ACRE
- E. OPEN SWAMP ..... 4=- ACRES

↑  
NORTH  
SCALE: 1" = 1000'

LEGEND

- SITE BOUNDARY —————
- VEGETATION TYPE BOUNDARY ······
- STREAM ————>
- INTERMITTENT STREAM ————>····>



# Archaeological and Historical Review

The Hebron Center Historic District, which is listed on the National Register of Historic Places, includes important components of the town's residential and business center. The National Register historic district both abuts and is partly included within the proposed business expansion area. (Appendix C) All future development within the expanded business area should be carefully reviewed and evaluated with respect to the appropriateness and compatibility of architectural design vis-à-vis the existing architectural character, scale, and overall quality of the historic district. In addition, local decision-making processes should emphasize retention of mature trees, fieldstone walls, and other significant landscape elements which define the existing rural character of the proposed business expansion area.

Due to its proximity to the town's historic center, and the apparent absence of significant ground disturbance, the proposed business expansion area appears to possess moderate to high archaeological sensitivity for prehistoric, historic, and industrial archaeological resources. A review of the state's archaeological site files and maps shows no known archaeological resource within the proposed project area. Nonetheless, the Town of Hebron should consult with the Office of State Archaeology in order to develop review coordination procedures at the community level for ensuring the professional identification, evaluation, and management of Connecticut's archaeological heritage. All studies must be undertaken in accordance with the State Historic Preservation Office's *Environmental Review Primer for Connecticut's Archaeological Resources*.

The Office of State Archaeology and the Connecticut Historical Commission are prepared to offer any technical assistance to the Town of Hebron in conducting the recommended review and archaeological survey of the project area.

# Planning Review

The Town of Hebron seeks to develop an expanded Central Business District (CBD). The Town plans to achieve this goal by developing a *New Village District Zone* to accommodate the development; developing new goals and policies for the CBD; and assessing new base data gained from the ERT review.

## Coordination with Regional Plans and Policies

This section comments on how the proposal relates to policies from the Regional Plan of Development (1988).

### Relevant Capitol Region Council of Governments (CRCOG) policies:

- 1 ) Encourage municipalities to actively engage in economic development planning, rather than allowing it to be determined solely through market forces.
- 2) Encourage industrial/commercial development in locations with adequate public services and transportation facilities.
- 3) Discourage structural development in the flood plain.
- 4) Promote protection of aquifer and water supply watershed areas.
- 5) Encourage conservation of agricultural lands.
- 6) Promote preservation of unique man-made and natural features of historic, cultural, and educational significance.
- 7) Promote the use of innovative zoning techniques to reduce capital costs of development.

- 8) Promote compliance with State law that requires municipalities to consider protection of existing and potential ground water supply in regulations and plans.

In the case of this proposed development, various policies may be in conflict, and not all can be fully achieved. For example, Hebron Center seems an appropriate site in which to promote economic development, yet it is not clear whether the public services are adequate. The infrastructure may be determined to be adequate, yet agricultural land is slated for development. Developing agricultural land near the Town Center may be justified if the end result is to concentrate the Town's development and preserve outlying agricultural lands for the long-term.

### **Soils, Erosion, and Sediment Controls**

The Team planner conducted a general soils analysis based on the Soil Map Table from the 1984 ERT report. Based on this analysis, she believes that the structures on the Master Plan are sited appropriately. However, a significant amount of the site is defined as "severe" for structures and roads. If the site is developed as indicated, roads will need to be extended through areas with "severe" limitations, which will necessitate additional engineering expenditures. In addition, these limitations mean that water and sewer lines across the site may also be more expensive to construct. The flood control, water quality, and habitat functions of the existing wetlands will be compromised to some degree.

Even at this early stage, it would be useful for the Town of Hebron Economic Development Commission to develop a *draft program* that includes:

- estimated area of impervious surface,
- proposed square footage of structures,
- proposed acreage of land uses.

This data will help planners and other specialists to estimate potential impacts more precisely.

## Land Use and Site Design

This section offers general recommendations regarding site design and land use.

### Land Use

#### Preserve Existing Residential Areas.

The existing residential and civic structures in Hebron's *Central Business District* enhance community character, and will help maintain the pedestrian friendliness of the downtown. Unless new commercial development is properly designed, it may threaten the stability of existing residential areas. The Town should seek to stabilize these areas by ensuring there is adequate buffering between residences and proposed businesses and parking. Also, traffic calming measures along Route 66 and 85 will be necessary. The Town should involve area residents at the initial planning stages: What are their concerns? How could the development help them?

#### Preserve Agricultural Character of Site.

The portion of the site that is former agricultural land may contain features such as stone walls, equipment, and vegetation that should be preserved and incorporated into the new site design. This will help preserve the historic and cultural character of the site.

#### Mixing Land Uses.

- Explore opportunities for mixing retail and residential uses within structures, or seeking more mixing of commercial and residential structures. The primary residential section appears to be segregated from retail uses.

- One issue is whether business structures, which will be largely unused during evenings and weekends, should be mixed with the other uses, or segregated from them as shown on the existing Master Plan. There are advantages and disadvantages to each approach. If the business district is segregated, a large part of the development will be vacant and quiet weekends and evenings. If the business uses are mixed with other uses, there will be more activity dispersed across the site and more of the site could be utilized, although pedestrian activity may be less concentrated.

## Site Design

### Structures.

- Two- or three-story development seems appropriate. This will reduce the building footprint, and is appropriate for a village-type streetscape.
- It would be beneficial if structures in the business district were sited closer together in accordance with “Village” Streetscape Principles<sup>1</sup>, if environmental and infrastructure conditions permit. This will enhance pedestrian friendliness, and reduce costs for infrastructure and site amenities.

### Parking and Road Design.

- At present, the site design does not seem to include a “main street” through the Master Planned area. It may be beneficial to identify a main street with appropriate streetscape design, so that key retail and commercial tenants feel they are getting good visibility.
- Consider designating parking on one side of streets.
- Consider implementing one-way roads where feasible, for two reasons:
  - 1) Will result in reduced impervious surface; and

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<sup>1</sup> Village streetscape employs “Zero” lot line and minimal side yard requirements to site structures close to the sidewalk and road, and close to adjacent structures. Thus, pedestrians feel like they are on a downtown shopping street.

2) Will reduce the road width, resulting in a more compact, pedestrian-scaled streetscape.

- The modified grid design of the Master Plan is effective. The goal should be to preserve existing topography, but also to develop a compact street layout.
- The majority of parking should be located to the periphery of structures and greens where possible, particularly in the business district.

### Traffic/Access

- It is critical that the Town fully assesses the traffic impacts to Route 66 and Route 85.
- Traffic calming measures along Routes 66 and 85 will be required.

### Recreation

- The Master Plan has a good series of pedestrian connections with surrounding civic and commercial uses.
- It would be advantageous to develop a well marked, passive recreation trail (may be low impact, gravel) that is accessible to area residents. The goal should be to connect with area residences in a low-impact manner.
- A significant investment in sidewalks will be required. Also, one to two pedestrian signals across Route 66 will be required.
- If additional active recreational facilities were developed on-site, for example a green where a public event such as a small fair or arts and crafts fair could be held, additional activity on weekends would be ensured.

## Aquifer Protection

According to the 1995 Zoning Regulations, the Town's Aquifer Protection District in the vicinity of Amston Lake (Map 2.1 1 ) is not located in the vicinity of the proposed development.

## Additional Observations

- It is critical that the Economic Development Commission undertakes a market analysis to determine the demand for the type of business, residential, and commercial space that this area can support. The 1984 ERT Report concluded that the hardpan till geology of the site will limit the type of foundation that can be built there. This will limit the size and type of structures, and thus the range of potential tenants. Also, there is a substantial amount of wetlands on the site, which may add extra costs for development and extension of infrastructure. The Economic Development Commission needs to assess whether these site limitations and the infrastructure investment required to develop the site will attract the types of tenants that can generate the income to justify this expense, and thus generate the income that the Town seeks.
- CRCOG encourages communities to develop senior housing near Town centers so seniors have better access to support services. The Town of Hebron should be commended for developing senior housing in the Center. This development will provide additional services for this community.
- Clearly, the Town will also need to consider potential traffic, environmental, and social impacts upon the nearby Town of Columbia.
- The Planners at CRCOG would be happy to provide assistance to the Town of Hebron as they proceed to develop the "New Village District" regulations.



# CT Department of Transportation Review

- Storm water runoff from the existing parking lot at the plaza on the north side of Route 66 empties into the Route 66 drainage system at the present time. The highway drainage system will have to be evaluated regarding its ability to serve any additional development.
- Every effort to minimize curb cuts should be made in the planning stage of any proposed development along the south side of Route 66 and Route 85.
- Sidewalks along Route 66 and Route 85 may be required for pedestrians, thereby minimizing internal vehicle movements depending on the type of development planned for the area.
- Access management practices, particularly internal walkways or connecting drives, should be examined for possible inclusion during the planning phase of any development.

At this time, no development plans have been drafted for the subject site. If a new development proposal or an expansion to an existing site development meeting minimum warranted threshold criteria is proposed, then State Traffic Commission procedures and certification guidelines will have to be addressed. In these cases, the development would be assessed for potential roadway impacts along Route 66 and Route 85. State Traffic Commission pamphlets have been enclosed for your information (Appendix D).

# Appendix A

For Appendix A-D Information Please Contact the  
ERT Office at: (860)345-3977

# **ABOUT THE TEAM**

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a variety of federal, state and regional agencies. Specialists on the Team include geologists, biologists, foresters, 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: 860-345-3977, Eastern Connecticut RC&D Area, P.O. Box 70, Haddam, Connecticut 06438.