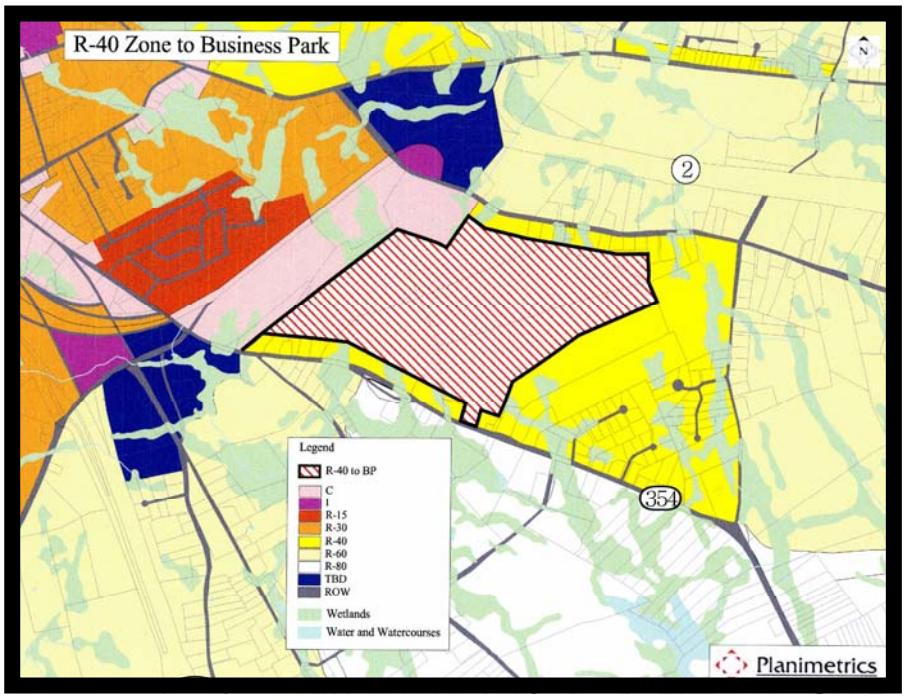
Proposed Zone Change

R-40 Zone to Business Park

Colchester, Connecticut



Eastern Connecticut Environmental Review Team Report

Eastern Connecticut Resource Conservation & Development Area, Inc.

Proposed Zone Change
R-40 Zone to Business Park

Colchester, Connecticut

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
Colchester, Connecticut

July 2005

Report #589

CT Environmental Review Team Program
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Haddam, CT 06438
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Acknowledgments

This report is an outgrowth of a request from the Colchester Conservation Commission to the Eastern Connecticut Resource Conservation and Development Area (RC&D) 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, Tuesday, February 1, 2005.

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James Rabbit	Senior Planner, AICP Southeastern CT Council of Governments (860) 889-2324
Randolph Steinen	Emeritas Professor Geology Program – UCONN (860) 486-4435
Eric Thomas	Thames River Basin Coordinator DEP – Watershed Management (860) 424-3548
Julie Victoria	Wildlife Biologist DEP – Franklin Swamp WMA (860) 642-7239

I would also like to thank Alicia Watson, wetlands enforcement officer, Chris Beauchemin, town planner, Sal Tassone, town engineer, Deborah Ouellette, Norwich Public Utilities, Falk vonPlachecki and Gary Avery, conservation commission members, Nicholas Norton, chair, conservation commission, Jenny Contois, first selectman and James Ford, chair, planning and zoning commission 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 plans, reports and related documents. Some Team members made separate or follow-up visits to the 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 landowner/applicant. This report identifies the existing resource base and evaluates its significance to the proposed use, 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 the review of this proposed zone change.

If you require additional information please contact:

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Introduction

Introduction

The Colchester Conservation Commission has requested Environmental Review Team (ERT) assistance in reviewing a proposed zone change.

The Colchester Zoning and Planning Commission is considering the adoption of a zoning district and associated regulations that would create a "Business Park Zone." One area proposed for that change is approximately 330 acres between Parum Road (Route 354) and Chestnut Hill Road. The area is currently zone R-40 and is in proximity to Route 2 and Route 11. It is within the upper reaches of the Deep River Reservoir watershed. The reservoir is a drinking water supply for the City of Norwich.

There is no present developer for the business park but the proposed zone presumes developer-funded extensions of municipal sewer and water.

The town is currently identifying areas appropriate for business and commercial growth and the study area meets locational criteria for economic development. The 2001 Plan of Conservation and Development identified this area for possible business park development and indicated a conceptual "ring road" through the area.

Objectives of the ERT Study

The Conservation Commission has many concerns regarding the proposed zone change to this area and is looking to the ERT report to provide them with an environmental assessment so that the town can make an informed and environmentally sound decision. Their major area of concern focuses on impacts

to the wetland systems on the site and impacts to the entire watershed. Specific concerns resulting from the intensity of the proposed development, including a 75% impervious surface allowance, are as follows:

- Location in a drinking water supply watershed;
- Extremely high water table soils and the hydrology of the area;
- The handling of stormwater drainage and water quality issues;
- Site design compatibility – can the uses allowed in the zone actually be built?

The Zoning and Planning Commission, while not the agency making the ERT request, also has concerns for the Team to address. They focus on:

- Functions of the wetlands onsite;
- Are wetlands crossings feasible for roads and driveways;
- If the area is not suitable for a business park what other land use or density would be feasible?

The ERT Process

Through the efforts of the Colchester Conservation Commission this environmental review and report was prepared for the Town of Colchester.

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

The review process consisted of four phases:

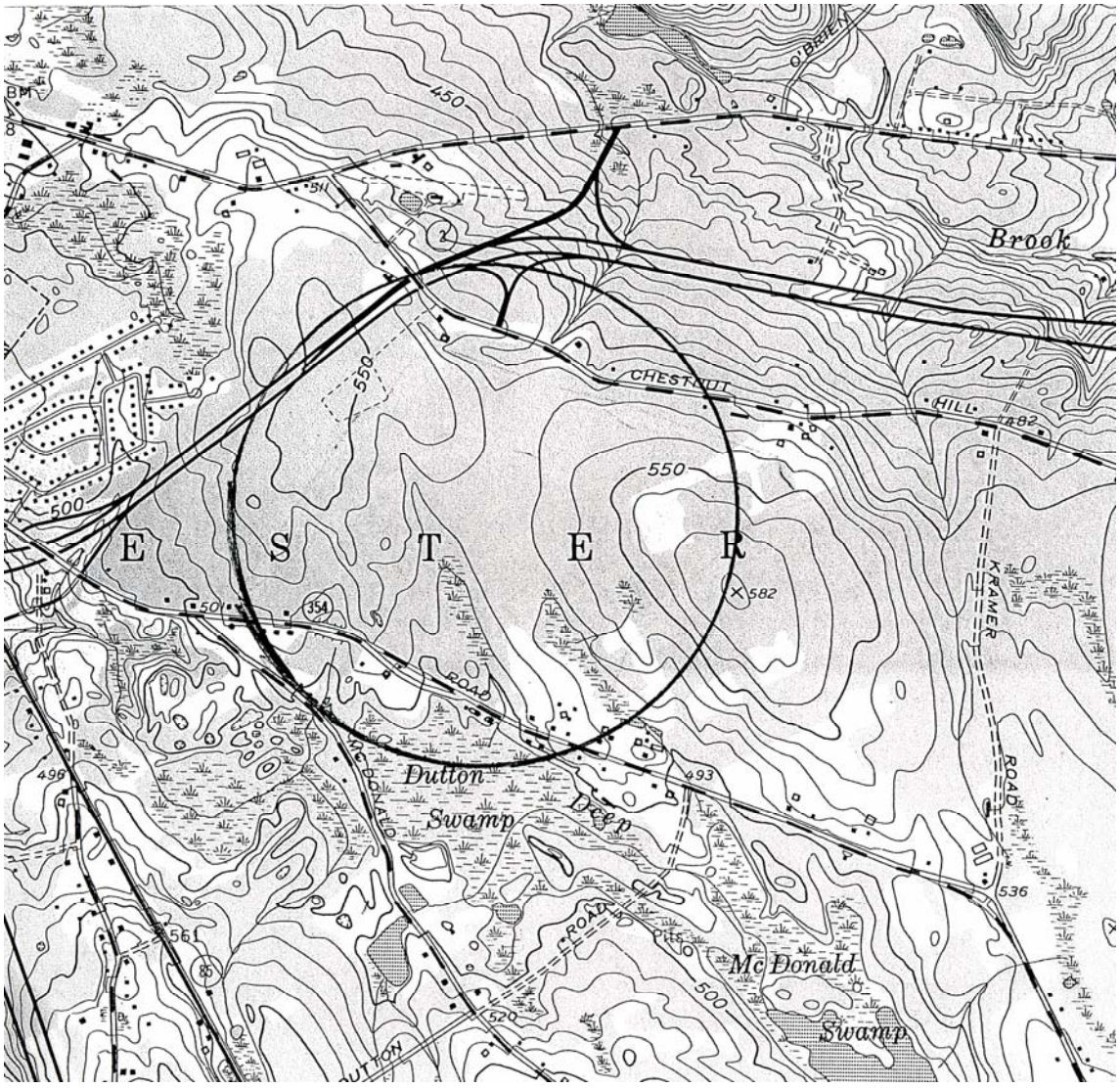
1. Inventory of the site's natural resources;
2. Assessment of these resources;
3. Identification of resource areas and review of plans; and
4. Presentation of education, management and land use guidelines.

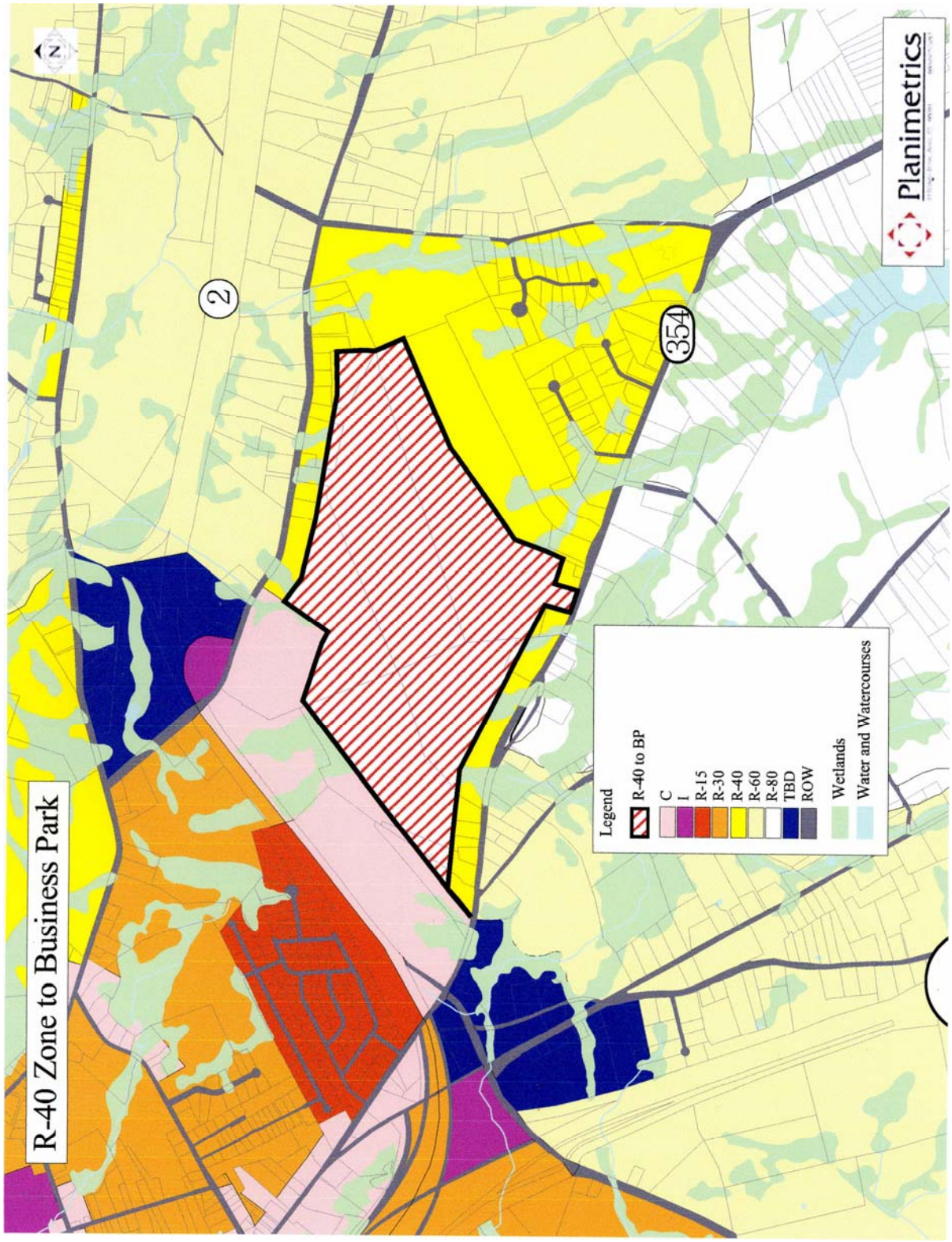
The data collection phase involved both literature and field research. The field review was conducted Tuesday, February 1, 2005. The emphasis of the field review was on the exchange of ideas, concerns and recommendations. Being on site allowed Team members to verify information and to identify other 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.

General Location Map

Scale 1" = 2000'




R-40 Zone to Business Park
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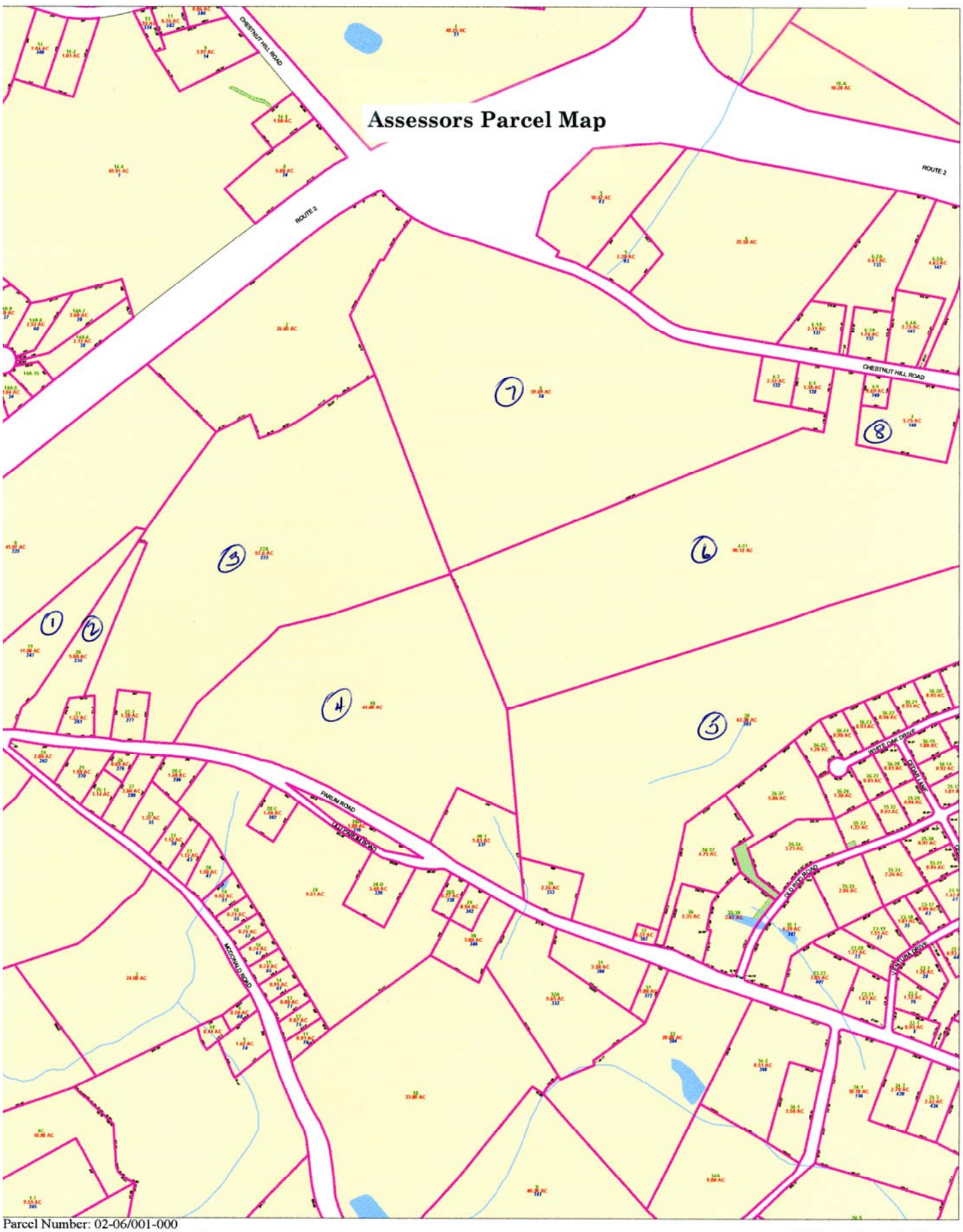
TBD
ROW
Wetlands
Water and Watercourses
Planimetrics



Parcel Number: 02-06/001-000
Street Address: 235 MCDONALD RD
Radius: 100

Town of Colchester

This map is for assessment purposes only. It is not to be used as a survey or for conveyance.

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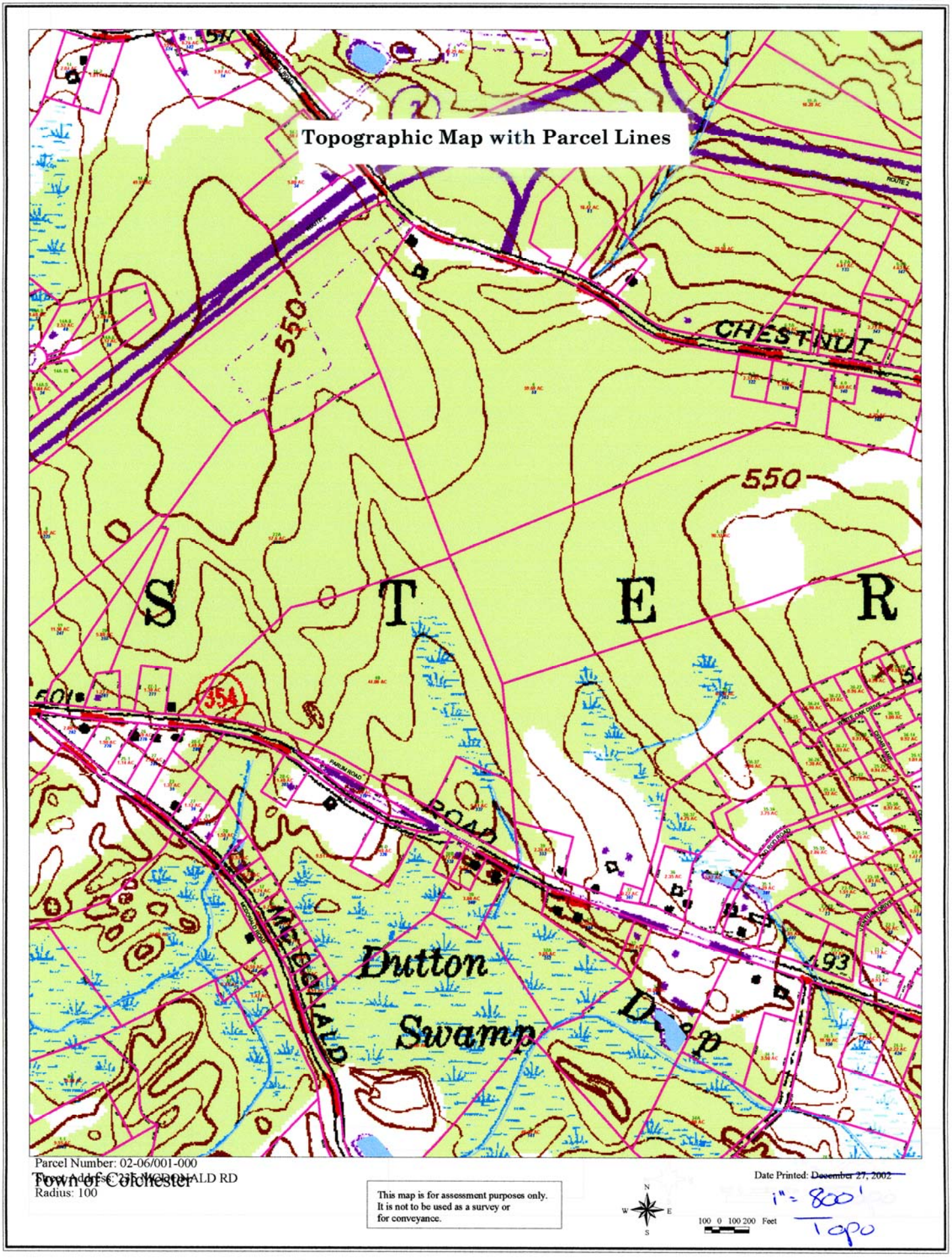
1" = 800'

Assessors Map


Topographic Map with Parcel Lines
CHESTNUT
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ROAD
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Swamp
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Parcel Number: 02-06/001-000
Town of Colchester
Radius: 100
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Topo

Topography and Geology

Topography

The parcel for which the Town of Colchester proposes a change of zone is relatively flat with low relief: elevations range from about 520'-580' over the 330 acre parcel. The parcel sits atop a broad oval shaped (plan view) hill that has poor drainage. The hill has rather smooth topographic contours and is streamlined when viewed in the field. This is the characteristic form of a drumlin, a glacial land feature. Drumlins are streamlined shaped hills that form beneath glacial ice. The ice in this case was approximately a mile thick and flowed slowly toward the south-southeast. Considerable pressure was exerted on the bedrock which was ground and abraded to a smooth form by the ice movement above it.

Surficial Materials

The soils on the parcel are modified from glacial till, which on the north slopes of the hill at least, is thicker than normal (Stone et al, 1992). Glacial till is an ice-laid deposit consisting of non-sorted, generally non-stratified, particles that have a mix of grain sizes ranging from clay to large boulders. The matrix of most is composed dominantly of silt and sand. Till may be deposited beneath glacial ice while the ice is moving over the land or left behind when the ice melts.

In an abutting subdivision, an excavation for a basement on plot (36-25) on White Oak Drive allowed two interesting observations. First, beneath the topsoil, the till is compact. This observation offers at least partial explanation for why the area is so poorly drained: compact tills have very low permeability and water cannot rapidly soak into the ground. This is borne out by the numerous failed perk-tests on the parcels. The second observation is, locally, an oxidized zone at the top of the compact till. It was observed in just half of the basement and was overlain by a thin bed (4") of laminated silt that was deposited from a small body

of ponded water, perhaps below glacial ice, near the end the most recent glacial episode. The oxidized zone is interpreted as the lower part of a soil profile formed during a period of interglacial weathering on top of an older till (Stone et. al, 1992). Stone infers that the thick till is part of an older ("lower") till.

Adjacent to the southern bound of the parcel is a stratified sand and gravel aquifer in the valley of Deep River. These deposits were formed by deposition from glacial melt water at the end of the most recent Ice Age. They consist of well sorted to poorly sorted gravel, sand and silt and generally have excellent permeability.

Bedrock

The area surrounding Colchester is underlain by Brimfield Schist (Rodgers, 1985). The Brimfield Schist is more gneissic than schistose but contains abundant iron-sulfide minerals. When freshly exposed, the Brimfield is black to dark gray, but the iron-sulfide rapidly oxidizes when exposed to form rust and sulfuric acid. It consists of rust-stained, garnetiferous biotite-muscovite schist with garnetiferous calc-silicate granofels and amphibolite gneiss. Outcrops of rock were not seen during the field visit (it is poorly exposed over the entire area according to Lundgren and Snyder) and none are indicated close to the parcel on published maps. Bedrock is the primary aquifer and may produce ground water with dissolved iron that will oxidize when exposed to the atmosphere (for instance, in a water closet or toilet bowl). Other than that, bedrock will not likely be a concern.

Conclusion

The area of the proposed zone change was shaped by glacial erosion and deposition during an older period of global cooling (probably about 150,000 yr ago) and then was covered by a thick sheet of ice during the most recent Ice Age which ended about 15-20,000 years ago. Thus, the till deposited during the older ice age is very compact and of low permeability making the land poorly drained. This poses several problems to development.

References

Lundgren, L.W., and Snyder, G.L., Bedrock Geologic Map of the Colchester Quadrangle, CT. Connecticut State Geol. and Nat. Hist. Survey Quadrangle Report #*21,* plate 2.

Rodgers, John, 1985, Bedrock Geologic Map of Connecticut. Connecticut State Geol. and Nat. Hist. Survey, Atlas Series: Bedrock Geologic Map.

Stone, JR., Shafer, J.P., London, E.H. and Thompson, W.B., 1992, Surficial Materials Map of Connecticut. U.S. Geol. Surv. and Connecticut State Geol. and Nat. Hist. Survey, 2 sheets.

Watershed Resources and Site Development Considerations

Surface Water Resources

The proposed regulation and zone change of focus in this environmental review are located within two sub-regional watersheds of the larger Yantic River regional drainage basin (39), or watershed. A watershed is the entire surface area that drains to a particular water body. The Sherman Brook basin (3903) includes the upper half of the proposed business park zone, while the Deep River basin (3904) includes the generally lower half of the proposed business park zone area. The Sherman Brook basin drains about 8.2 square miles, while the Deep River basin drains about 8.9 square miles before each discharge into the larger Yantic regional watershed southeast of the review area. There are three bands of inland wetlands generally trending northwest to southeast with small intermittent streams feeding downstream Deep River and Sherman Brook off the site. The wetlands and generally high water table form the headwater contribution to these first order streams.

The State Water Quality Classifications classify surface and ground waters in the state by existing water quality conditions, a classification goal, and its designated uses and the State Water Quality Standards. The Standards and Classifications are designated to manage water quality to protect health, the environment, and legitimate uses of water resources. The complete State of Connecticut Water Quality Standards and Criteria document is available on the CT DEP web site at: http://dep.state.ct.us/wtr/wqsinfo.htm .

The review area's known streams and other waterbodies within the northern portion of the site (within the Sherman Brook basin) are each classified as "A" surface water quality. Class A waters overall have excellent water quality and

are designated for: habitat for fish and other aquatic life and wildlife; potential drinking water supplies; recreation; navigation; and water supply for agriculture and industry. The roughly southern half of the site's known streams and other waterbodies are each classified as "AA" surface water quality. Class AA waters overall have excellent water quality and are designated for: existing or proposed drinking water supplies; habitat for fish and aquatic life and wildlife; recreation; and water supply for industry and agriculture.

Groundwater Resources

The northern half of the review area's groundwater quality classification (within the Sherman Brook subregional basin) is GA. Such groundwaters are within the area of existing private water supply wells or an area with the potential to provide water to public or private water supply wells. The Department of Environmental Protection presumes that ground water in such an area is, at a minimum, suitable for drinking or other domestic uses without treatment.

The southern half of the site's groundwater quality classification (within the Deep River subregional basin) is GAAs. This classification refers to ground water that is tributary to a public water supply reservoir (in this case it is the Deep River Reservoir). Such groundwaters have designated uses to include: existing or potential public supply of water suitable for drinking without treatment; and baseflow for hydraulically connected surface water bodies. There is no known State Aquifer Protection Area designation within the proposed business zone area between Parum Road and Chestnut Hill Road.

A review of the state Leachate and Wastewater Discharge Sources Inventory (1998), that supports the Water Quality Classifications, resulted in no known locations that would impair the Class "A" or "AA" surface water quality goal. This reviewer did not observe any areas of potential pollution threats to surface water quality during the February 1, 2005 site visit.

List of Contaminated or Potentially Contaminated Sites in Connecticut

This list represents the Hazardous Waste Facilities as defined in Section 22a-134f of the Connecticut General Statutes. This list includes only sites that DEP is aware of. However, there are many potentially contaminated sites about which DEP has no information and therefore do not appear on the list. DEP will update this list quarterly. Any site's presence or location on the list does not imply a degree of contamination or relative priority. The current list includes 25 listings within the Town of Colchester. Nearly all Colchester listings are leaking underground storage tank (LUST) sites undergoing various levels of investigation or remediation. It is recommended that this list be correlated with the proposed business zone area between Parum Road and Chestnut Hill Road. To obtain more information about a particular site you may contact the Remediation Program at DEP at (860) 424-3376. Depending on available resources, DEP staff may be able to provide further information. In addition, files related to the activities regulated by the DEP may be obtained for review at the DEP File Room at 79 Elm Street in Hartford, CT.

Basic Concepts of Watershed Protection

Headwater streams such as Deep River and Sherman Brook are typically short in length and drain relatively small areas, but are important because they comprise the majority of the 8,400 stream and river miles in Connecticut. What happens in the local landscape is directly translated to headwater streams and major receiving waters are affected in turn. As rural areas of Colchester suburbanize, streams handle increasing amounts of runoff that degrades headwater streams as well as major tributaries. Specific resource protection concerns for Deep River and Sherman Brook include contributions to stream

base flow, and cold temperature levels, as well as excess sediment and nutrient loads providing for potential pollutants to the downstream public water supply reservoir managed by Norwich Department of Public Utilities.

Focusing on the headwater stream level is important in watershed management for several reasons:

1. Headwater streams are exceptionally vulnerable to watershed changes;
2. Headwater streams are visible at the same geographic scale as development;
3. The public intuitively understands streams and strongly supports their protection; and
4. Headwater streams are good indicators of watershed quality.

The watersheds and sub-watersheds that drain to these streams are easily identifiable landscape units that tie together the terrestrial, aquatic, geologic, and atmospheric processes. They are the most appropriate geographic unit to protect water resources.

As part of the federal Clean Water Action Plan, the CT DEP and the USDA-Natural Resources Conservation Service conducted a Unified Watershed Assessment for all CT waterbodies in 1998. Based on existing documents and other available water resources information, the overall health of both the Sherman Brook and the Deep River sub-regional watersheds appear to be good.

- It should be a goal of the state, regional and local watershed stakeholders to **protect** the overall health of these sub-regional watersheds. As stated previously, these drainage basins are nested within the larger Yantic River regional basin. Land use development proposals, especially in the upper headwaters, within the Sherman Brook and Deep River subregional drainage basins should be carefully reviewed for incorporation of best management practices (BMPs) to protect downstream water quality.

Potential Water Quality Issues

The natural elements of nitrogen and phosphorus are often the most common nutrients of concern to water quality. Both can be found in high concentrations in polluted runoff. Nutrients are associated with runoff from poorly managed forested lands, urban runoff from lawns, pet wastes, commercial developments, as well as from leachate from on-site septic systems. These pollution sources all exist within the Sherman Brook and the Deep River sub-regional watersheds. Unchecked nutrient pollutant management can lead to some downstream impacts to Deep River Reservoir and eventually to the Yantic River. The CT 2004 Water Quality Report to Congress, often referred to as the 305(b) report, does not include an assessment of surface waters or ground water segments within the proposed business zone change. This same report does list the 245-acre Deep River Reservoir as an active distribution reservoir for public water supply for Norwich Public Utilities. This reservoir is identified with an oligotrophic status. This refers to a trophic level in a waterbody that is low in plant nutrients. There is generally low biological productivity and an overall absence of macrophytes plant beds. Accelerated nutrient, sediment, and other potential pollutant loads from an unmanaged upper watershed area can tip the low productivity balance of such a waterbody.

- The cultural pressures on this ecological process bear important consideration for planners in the Colchester community. Local actions with the proposed business park zone may lead to unplanned impacts to trophic status in the Deep River Reservoir managed by Norwich Department of Public Utilities. Other sections of this report will provide additional comments towards this issue.

Proposed Zoning Change

The State of Connecticut Proposed Policies Plan of Conservation and Development (2005-2009) includes a statewide Locational Guide Map. The subject area is categorized as Conservation and as Preservation. In 2004 the Town of Colchester submitted a request to the State Office of Policy and Management (OPM) to change the categorization of the subject area (bounded by Chestnut Hill Road and Parum Road toward Framer Road) from Conservation and/or Preservation to the Growth category. OPM officially responded to this request by recommending no change to the categorization. "The area recommended for change to a Growth category lies within the headwaters of the Norwich Department of Public Utilities' Deep River Reservoir water supply watershed. The State Plan considers intensive land uses and the provision of water, sewer and roadway infrastructure within water supply watersheds to be inconsistent with the need to assure potable drinking waters at reasonable costs. National studies indicate that the presence of impervious surfaces begins to degrade drinking water quality event at very low levels of surface coverage (around 10% is a commonly stated threshold in the academic and planning literature). The Norwich, New London and Groton water supply systems are considered regionally significant economic resources that deserve careful stewardship."

- The recently adopted State Policies Plan (including the Locational Guide Map) should be available to community planners and other stakeholders through the OPM website by July 15th.

- A corollary to the statewide planning and policies plan is sound management decision-making at the local community level. A focus here is source water protection. Source water is untreated water from streams, rivers, lakes or underground aquifers that are used to supply private wells and public drinking water. Preventing drinking water contamination at the source

makes sense (good public health sense; good economic sense; and good environmental sense)

Planning Considerations

Innovative uses of zoning to protect water quality can be an effective tool for the Town of Colchester to protect public water supply watersheds. The creation of a network of zones that overlay traditional zoning district boundaries can work towards protecting stream, ponds, reservoirs and larger watershed areas, even as the Town promotes greater development across the community.

- A water protection overlay zone can be established to protect a water resource of community and regional interest. The process provides an overlay of existing zoning districts and requires additional checks to the underlying district zoning requirements, which remain in effect except to the extent the overlay zone provisions specifically modify it. The desired end result can be the protection of water quality by setting additional standards for development and by incorporating site-specific review procedures.

Standards to consider developing in such a water resources protection overlay district include:

1. Limitations on impervious surface (IS) cover
2. Setbacks
3. Buffers
4. Restrictions on the use of hazardous materials
5. Septic system regulations
6. Erosion control
7. General standards

- Overlay zones for protecting public water supply watersheds, such as the Deep River Reservoir watershed, should be considered carefully. An

underlying zoning district that sets a low overall density can be complemented with overlay zone requirements such as mandatory clustering of development and protection of sizeable open space buffer areas. This combination of zoning objectives can counteract the potentially negative impacts of increased density of development by placement of public sewers in a public water supply watershed.

- It may benefit the Town of Colchester to propose a committee to draft such an overlay zoning district that protects the public water supply watershed of the Deep River Reservoir, while considering the Town plan to promote appropriately scaled business/commercial development in the subject area. A diversified membership will reflect varying community opinions and concerns, and if done well, can produce a draft ordinance to establish a community-supported, overlay-zoning district that meets multiple objectives for this area in Town.

- If the public water supply Deep River Reservoir watershed is the resource of focus, then ideally the Town should collaborate with the City of Norwich to implement a watershed-based zoning district – thus covering all land that affects the reservoir, its surface tributaries, and the contributing groundwater resources of that watershed. The development of watershed-based zoning districts is a broadly recognized policy that leads to water quality benefits in support of several nationally-recognized smart growth principles.

Regional land use data are inadequately described in this site plan. These data are especially important because of the relationship between land use and site development runoff pollution. Any resultant pollution management must be based on the specific site and regional land use conditions for both the Sherman Brook and Deep River Brook sub-regional watersheds.

- The Town commissions should consider requesting additional information to meet this decision-making need. The site's watershed boundaries, or drainage basin divides, should be clearly delineated on revised zone change proposal. This was not evident in the information packet provided to ERT members, though it was found as a shaded element of an acetate overlay in the Town Plan of Conservation and Development (2001).

The State Water Quality Standards for both Class A and Class AA watercourses and waterbodies neither promote "zero impact", nor preclude adjacent residential or commercial development, as long as the development does not result in degradation of the waterbody classification.

- An overall resource management recommendation is to identify a resource protection goal of the Town of Colchester to strive for natural stream flow and temperature conditions.

This was not apparent upon review of the Town's 2001 Plan of Conservation and Development. Such a Town goal would be useful in context with resource planning considerations in this proposed business zone change area. The 2001 document includes a statement in Chapter 5, Page 29, under Water Quality/Water Supply Sources – "Zoning designations should be evaluated (especially in the Deep River watershed) to protect water supply sources."

Stormwater Management

Non point source pollution (NPS) occurs when water runs across the land mosaic, and picks up pollutants and deposits them in surface waters and groundwater. NPS has now become the nation's leading source of water quality degradation. Everyone is a NPS contributor in our everyday lives. The focus of NPS management is to educate ourselves about the inputs and apply NPS management principles to activities such as zone change proposals.

Stormwater from cumulative urbanization can be a significant non-point source of pollution. Management of both the quantity and quality of runoff should be considered to protect receiving waters, such as downstream Deep River and Sherman Brook.

Driveway standards and paving materials that are supportive of minimizing runoff and maximizing on-site infiltration in appropriate receiving soils should be considered.

- This will be a challenge with the very high percentage of wetlands and potentially high water tables distributed across the review area.

- One opportunity for the Town and the applicant to pursue alternative driveway construction is with a program administered by the University of Connecticut, called the Non-Point Education for Municipal Officials (NEMO) Program. The program's mission is to educate municipal land use decision makers about the connection between land use and water quality, and provide these key stakeholders with technical information on how to reduce the environmental impacts of new development.

- The Town of Colchester should consider reviewing alternative driveway plans and designs, construction and post construction elements of NEMO techniques. You can view the information on NEMO's web site at: http://www.nemo.uconn.edu . Another excellent source of case study and literature information can be found at the Stormwater Manager's Resource Center website, located at: http://www.stormwatercenter.net .

The zone change proposal does not provide an analysis of downstream impacts to the Sherman Brook streamside, or riparian, corridor by this development

proposal. Permitted developments associated with this zone change proposed, if approved, will not be isolated within this watershed. Several commission and Town staff members raised concerns during the site visit of development impacts to wetlands and watercourses. It is reasonable for the Town to understand any anticipated downstream impacts to private and public lands, transportation infrastructure and water resources.

- The Town Inland Wetlands Commission should utilize its Upland Review Area regulation to require the applicant to explain how any impacts from the zone change proposal are consistent with the State Inland Wetlands and Watercourses Act.

If the applicant can successfully document to the satisfaction of the Inland Wetlands Commission that the permitted activities are fully consistent with the purposes and provisions of the State Inland Wetlands and Watercourses Act, then the applicant is likely entitled to receive a permit. The determining factors that the Commission must weigh in making its decision on the application should be available on a Commission checklist, as prescribed in section 22a-41of the Connecticut General Statutes.

Watershed Resources Protection and Alternative Development Options

Watershed protection is a technique to provide long-term water quality benefits. Specific to non- point source (NPS) pollution controls, site plan reviews are an integral component of a watershed protection program. During site development, efforts should be made to protect, to the extent practical, the natural integrity of watersheds and natural drainage systems. Two additional

components of a watershed protection program for the Town to consider include: 1) avoiding conversion of areas susceptible to erosion and sediment loss; and 2) preserve areas that provide important water quality benefits and/or are necessary to maintain stream corridors and aquatic biota.

Colchester Conservation Commission members raised concerns during the site walk about proposed development impacts on the wetland and watercourse resources in and adjacent to the development sites. Inquiries were made for suggested options available to the town toward wetland/watercourse resource protection.

- The DEP Watershed Management Program supports wetland buffer protection areas to retain viable watershed health, as is currently in place for much of the Deep River Reservoir watershed.

- The DEP supports and recommends the use of undisturbed, vegetated buffers to protect wetlands and watercourses from myriad environmental impacts.

Buffers trap road sands, contaminants and other pollutants contained in stormwater runoff generated from roadways, parking lots, roof tops, and other impervious surfaces, as well as eroded sediments occurring from natural scour or land moving activities such as site development and other soil disturbances, including farming activities. The importance of forested streamside buffers has been well documented in the scientific literature. In addition to the benefits described above, these riparian buffers also help moderate the temperature of stormwater runoff before it enters the watercourse, thereby reducing thermal impacts on aquatic wildlife. Maintaining or enhancing naturalized streambank vegetation on all watercourses will shade the water, limiting temperature

changes and supporting higher dissolved-oxygen levels. Consider providing native plantings to enhance or extend the buffer zones around all wetlands and watercourses and/or adopting a no-mow zone to allow these areas to re-vegetate naturally.

Upland Review Area Guidance

The term "upland review" is promoted by DEP to describe the non-wetland or non-watercourse area in which certain types of activities, as defined by your municipal regulations, are regulated activities. This term best conveys the regulatory scheme under the state Inland Wetlands statutes wherein a wetland agency reviews regulated activities case-by-case and approves or disapproves them on their merits.

- It is the Department's policy to encourage municipal inland wetland agencies to review proposed activities located in upland areas surrounding wetlands and watercourses wherever such activities are likely to impact or affect wetlands or watercourses.

The Department produced a document*, Guidelines: Upland Review Area Regulations, Connecticut's Inland Wetlands and Watercourses Act*, (June, 1997), which is available at Inland Wetland Commissioner Training workshops conducted annually by the Department's Wetland Management Program staff. The DEP believes that a 100 foot-wide upland review area is sufficient for reviewing most construction activities in areas surrounding wetlands or watercourses because most of the activities that are likely to impact or affect these resources will be located in that area. The Department emphasizes that other municipal authorities and mechanisms involving planning, zoning and

subdivision decisions and plans of conservation and development, play a role in addressing the broader watershed issues.

Protected Open Space Management

The information packet described existing conservation easements on portions of the proposed business zone change area. Such easement area boundaries were not observed during the Team's site visit. During the Team's site visit discussions, it appeared the Town did not have much experience with promoting acquisition of, accepting or managing protected open spaces within the community.

- It is recommended that the Town consider developing a boundary marker and monitoring plan for the protected Conservation Easement areas. Field marked open space boundaries along road and lot lines will provide the town staff, the site contractor, and all sub-contractors with a clear understanding of where these areas exist, thus minimizing unintentional impacts during construction. The Town could extend this educational outreach campaign by placing a letter in lot files associated with the business park zone (if approved). The letter would identify to the new lot owners (and subsequent owners) the conservation easements and the desire by the town to protect the wetland and stream belt corridor through the development.

- The Town should consider the formation of, and municipal support for, a Colchester (or regional) land trust. Norwich DPU, with stakeholder interest in this proposed business zone change, should consider forming a partnership with such a land trust initiative to protect land around its drinking water sources. Land trusts can build the case amongst local citizens for the importance of funding land protection for water supply

purposes, while assisting the water supplier in identifying and securing undeveloped open space with water supply protection value.

- One supportive fact on the side of considering a local or regional land trust: the public support for land protection for public water supply protection consistently scores as a high if not higher priority in most public opinion polls than other purposes such as wildlife habitat. It is usually clear to a broad segment of the public of the necessity of raising local revenue to protect their public water supply.

- A statewide support network is in place to provide initial and detailed information to pursue this suggestion. The network is based out of the Land Trust Service Bureau, located at the Nature Conservancy Connecticut Chapter office in Middletown.

Planning Green for the Future

The Town of Colchester, along with Norwich Public Utilities and others should consider collaborating on the development of a green infrastructure plan. Such a plan will provide for future growth such as this planned business zone, by prioritizing what open space should be protected and what open space should be available for development. A green infrastructure plan (GIP) would identify and protect critical ecological sites and linkages in advance of planning and construction of infrastructure and development of land. Recurring project-level decisions about conservation could then be avoided by identifying targeted sites comprehensively and early within the GIP. Identifying and planning for priority conservation areas prior to development is critical because of the high cost of restoration and the difficulty of creating human-made systems to mimic natural processes, such as water filtration. Where development is already present, a GIP can help communities to set priorities for restoring areas and linking them to other open spaces.

Wetland Review

Upon initial review, the Plan of Development appears to be trying to mandate the land to embrace a plan of development at the expense of the wetland resources. This scenario is understandable on the one hand because of the geography involved. The proximity to Route 2 *is* ideal. Access to the site would be simple and efficient.

But on the other hand, if you see that advantage, you cannot help but also see the diverse and expansiveness of wetlands in the area. Thus, the location features two great assets: A.) its proximity to the highway, and B.) its wetland resources. So the underlying question is: does the strength of one asset trump the value of the other?

The ERT Team was given information and a number of maps that, when taken together, are the culmination of four to five years of planning iterations and proposals for the area. Because of this the ERT had the advantage of observing a variety of proposal options for the area (commercial projects and residential subdivisions).

This reviewer was able to review the materials (maps, letters, statements, plans, assessments etc.) in particular, for the commercial development that abuts the proposed zone change to the north.

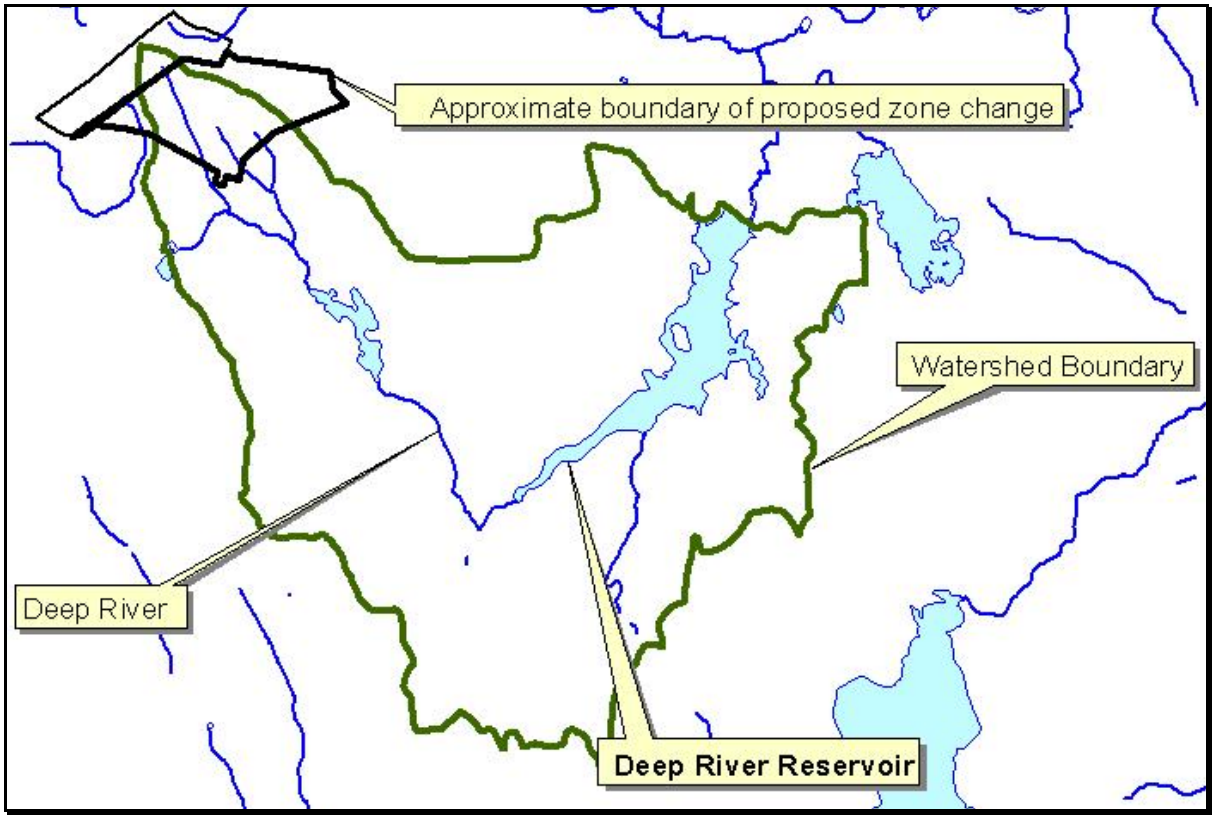
The reported size of the commercial parcel is 144 acres of which, 35 acres, or approximately 25 percent, is mapped as wetland (P. Sharp report, p.1). It is important to observe that the maps depict the wetland boundaries, like the property boundaries, ending at the border of the parcel. But unlike the property boundary, the true extent of the wetland continues off the property in a variety of directions as depicted on other BL Companies maps. Thus, the wetlands on the site are a part of an extensive wetland system in the vicinity.

Two distinct wetlands areas had been shaded and labeled as Conservation Easement Areas. One of those areas is a large wetland that has been described as being very productive and extensive. It is home to three of ten vernal pools on the site and in 2000

they contained 56 percent of all egg masses counted, including 77 percent of all wood frog masses inventoried.

Some of the wetlands on the site combine to form the headwaters for the main tributary of Deep River. That is, this location is at the very top of the watershed and literally gives rise to Deep River. This watercourse leaves the proposed business park zone change delineation and travels about 2.8 miles (~14,900 feet) before flowing into Deep River Reservoir, a 233 acre public water supply Reservoir (see map below). That makes this a public water supply watershed that by definition contributes drainage to active, emergency and inactive reservoirs owned and operated by community water systems providing water service in Connecticut.

Both the surface and groundwater quality associated with this tributary, and the entire Deep River drainage, is mapped by the DEP as AA. On a scale of AA, A, B, C, D, it is clear that AA is the highest water quality rating obtainable in the state. (see note below map)



Proposed area of zone change and its position in the Deep River Reservoir Watershed.

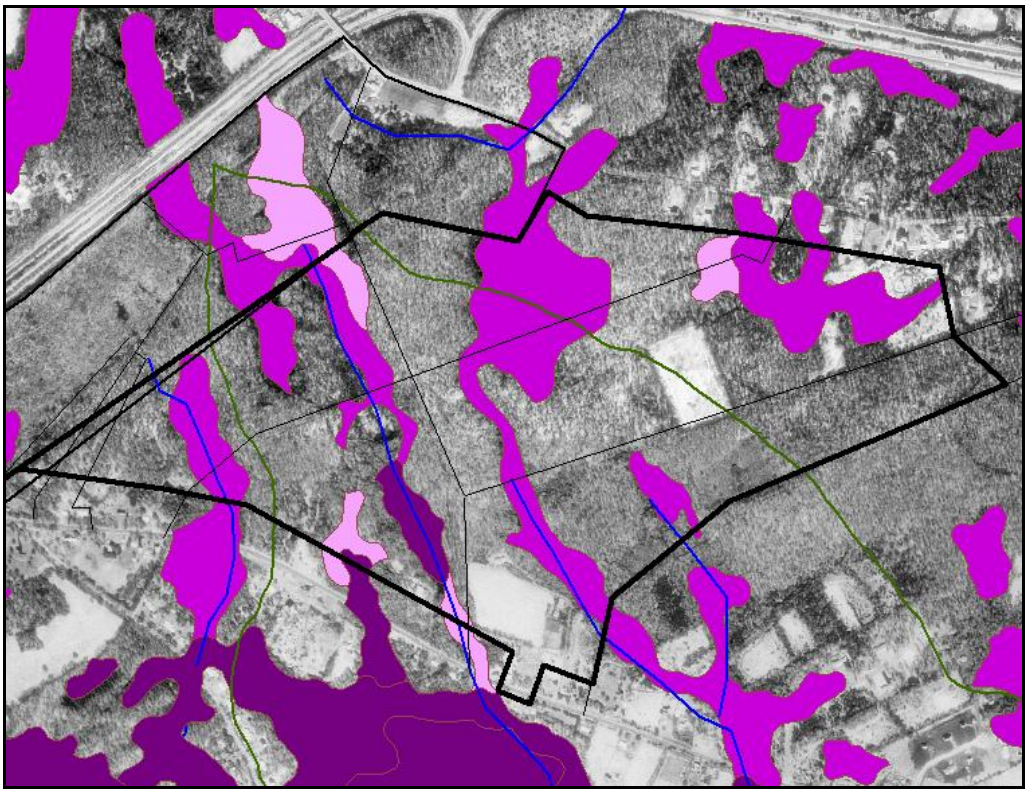
NOTE: Water Quality

The surface water quality (which includes the wetlands and watercourses) has been mapped by the DEP as follows:

- Deep River and all of the tributaries and wetlands are classified as AA. Although not all of the drainage can be field-tested, the assumption of quality is made based on a variety of known information and indicators.

- The same is true for the ground water quality. The entire drainage is classified as GAA which is the highest classification given in the state. As with the surface water, not all of this was field checked for the creation of the map but indications point to, and the result is mapped as, excellent water quality.

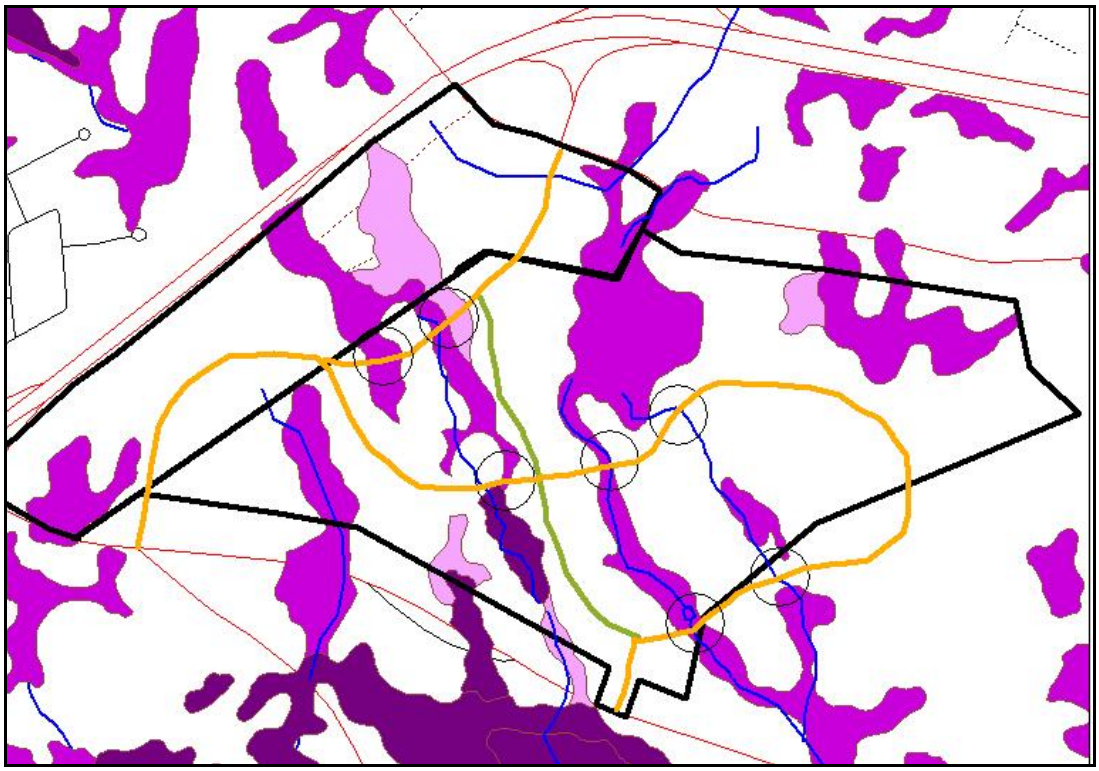
Source: The water quality classifications as described in the: Summary of the Water Quality Standards and Classifications (1997); and DEP water quality maps.



Approximate individual property boundaries and proposed zone change area with wetland soils in shades of blue and watershed boundary in red.

The wetlands on the site have the ability to provide such excellent drinking water because of their uninterrupted status on the landscape. As with so many natural resources, the high value comes from the integrity of the resource. That is, because the wetland systems take their rise and flow uninterrupted across the landscape they are able to contribute excellent water quality to the reservoirs downstream. Segmentation of the resources, specifically, chopping the wetlands and/or watercourses it into several smaller sections by road cuts, directly impacts the ability of the wetland system to function fully and produce the water quality it does now.

The figure below shows the locations of seven (7) road cuts and the resulting segmentation of the wetlands and watercourses from the proposed road system.



Various classifications of wetland soils are depicted here in shades of blue with the road system through the area of proposed zone change. The seven circles indicate the seven road crossings making it easy to envision the segmentation of the wetland resources if this proposal carried through.

In addition, the commissions must ask themselves to consider what an acceptable setback is from this wetland system. When a buffer is added to the wetlands and watercourses of 50 or 75 feet, the actual buildable acreage diminishes substantially.

Consequently, unless the town is:

- willing to compromise the functionality of the wetlands system,
- disregard the wetland buffers common to most communities in the state, and
- allow road sand, salt and other pollutants to enter and impact the wetland system,

it is difficult to understand the continued discussion of any type of construction in the proposed zone change area.

Other comments

Stormwater runoff quality for the commercial development is addressed in Mr. Doug Hoskin's letter of 5/17/00. His point regarding reduction of impermeable surface is worth re-reading. One of the most often cited references to parking lot paver blocks is at the West Farms Mall on the Farmington/West Hartford town line. Much of the Christmas-season parking has been constructed using this method. Visually, it appears as grass. Practically, it is permeable surface which is not open to parking except for the four to six busiest weeks of the year.

Conclusion:

The wetlands in the proposed zone change area provide many benefits to the town. Any final plan should also protect the headwaters of the water supply watershed upon which thousands of individuals depend for their drinking water.

Stormwater Management

The comments in this section are based on review of the general information provided, during the 2/1/05 ERT field review, regarding the proposed regulation/ zone change of a parcel between Chestnut Hill Road and Parum Road. The town is considering rezoning the parcel from R-40 to "Business Park Zone." The site is in the upper reaches of the Deep River Reservoir watershed, a drinking water supply for the City of Norwich, includes an extensive wetlands system, and is primarily made up of soils with a high groundwater table. The proposed development would be contingent upon the extension of sanitary sewer and water lines by the developer.

Runoff from construction and post-construction activities has the potential to pollute nearby wetlands and watercourses and impact the drinking water supply. During the period of construction, the discharge of sediment, particularly during significant storm events, would occur even when all reasonable controls are installed. Post construction, the increase in the quantity and peak flow of stormwater runoff, would contribute to downstream flooding and erosion problems. Additionally, the quality of post construction stormwater runoff, from the large impervious areas associated with commercial/ industrial activities, would be degraded by the presence of pollutants such as hydrocarbons, metals, and total suspended solids.

In order to minimize the pollution potential from stormwater, the following is a list of recommended management measures:

- Avoid the crossing and disturbance of wetlands to the maximum extent possible. Therefore, the construction of a ring road and internal access roads, which would cause substantial disturbance to wetlands/ watercourses, is strongly discouraged.

- Establish setback or buffer areas (50 feet, minimally, to 100 feet, preferably) within upland areas adjacent to wetlands or watercourses.
- Reduce the impervious area to decrease the amount of runoff needing treatment, especially where stormwater management challenges exist (poor soils, presence of wetlands/ watercourses, high groundwater table, presence of ledge, etc.).
- Promote sheet flow to the maximum extent possible, by eliminating curbs, utilizing pervious pavement, installing vegetative swales, employing level spreaders, etc.
- Infiltrate stormwater discharges to the maximum extent possible to promote groundwater recharge and lessen the quantity of runoff needing treatment. At this site, however, infiltration will not be feasible in the Aquifer Protection Zone and where the water table is high. The option of employing fill to allow infiltration of stormwater exists, although it may be cost-prohibitive.
- Install structural stormwater management measures to treat stormwater runoff during construction. Such measures include, but are not limited to, earthen dikes/ diversions, sediment traps, check dams, level spreaders, gabions, temporary or permanent sediment basins and structures. However, site constraints may limit the utilization of such measures and provide a significant impediment to providing adequate erosion and sedimentation controls.
- Include the installation of oil & grease and sediment removal structures in any stormwater collection system receiving post construction runoff from parking and driving areas. Such measures include, but are not limited to, detention and/or retention basins and advanced design gross particle separators which can provide a goal of 80% total suspended solids removal. Site constraints (i.e. high groundwater table) may limit the option of utilizing detention or retention basins and so, advanced design gross particle separators, a more expensive alternative, would need to be utilized to manage post construction runoff.

- Prepare a stormwater management plan, which considers both quantity and quality of runoff for the entire site, rather than piecemeal during development of each lot.

In addition to the preceding comments, the following requirements apply to any construction (business park, residential subdivision, etc.) activity which may occur in the future:

- In order to protect wetlands and watercourses on and adjacent to the site, strict erosion and sediment controls should be employed during construction. The *Guidelines for Soil Erosion and Sediment Control* ("E&S Guidelines") prepared by the Connecticut Council on Soil and Water Conservation in cooperation with DEP is a recommended source of technical assistance in the selection and design of appropriate control measures. A newly revised edition of the Guidelines has recently been published as DEP Bulletin 34. Copies may be obtained at the DEP bookstore, either online at www.dep.state.ct.us/store/index.htm or by telephone (860) 424-3555.
- Any disturbance of 5 acres or more must register for the General Permit for the Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities, issued October 1, 2002, modified April 8, 2004 ("the general permit"). For sites with 1-5 acres of disturbed area, registration under the general permit is not required provided written town approval of its erosion and sediment control measures is obtained, and the E&S Guidelines are followed. Registration describing the site and the construction activity must be submitted to the Department 30 days prior to the initiation of construction. A stormwater pollution control plan, including measures such as erosion and sediment controls and post construction stormwater management, must be prepared. For sites where more than 10 acres will be disturbed, the stormwater control plan must be submitted to the Department. A goal of 80 percent removal

of total suspended solids from the stormwater discharge shall be used in designing and installing stormwater management measures. For further information and to obtain the necessary registration forms, contact the bureau at (860) 424-3018.

Fisheries Resources

Deep River

The headwaters of Deep River originate on the property, which is being considered for a zone change from R-40 to Business Park. One of the more important functions of a headwater stream is to provide clean and unpolluted waters to downstream areas of a watershed, which contain an increased diversity of aquatic organisms. Based upon a site inspection, it appears that these headwaters (2 separate branches) do not support a fish community on this property; however, more viable instream fish habitat was found nearby in the area of the watercourse south of Route 354 and upstream of the Dutton Road crossing. Despite the absence of a fish community on the property considered for rezoning, these water resources and associated wetlands do provide very important ecological functions including but not limited to: flood storage, stream flow augmentation, nutrient assimilation and sediment retention. It is possible that these vital functions could be impacted by future commercial development of a business park.

DEP Inland Fisheries Division electrofishing survey data were collected from the headwater reach of Deep River on June 30, 1993. Sampling location was approximately 500 meters upstream from the Marvin Road crossing. The stream was found to support a coldwater fish community that primarily featured native brook trout. Other stream dwelling fish found in abundant numbers included blacknose dace and tessellated darter. A small number of warmwater species including golden shiner and brown bullhead were also found. The presence of these species is most likely due to emigration from open water habitats in McDonald Swamp or Deep River Reservoir, a water supply reservoir for the City of Norwich.

DEP surface water quality classification of Deep River on this property is listed as “AA”. Designated uses for this classification include: existing or proposed

drinking water supply, fish and wildlife habitat recreational use (may be restricted) agricultural or industrial supply and other legitimate uses including navigation.

Potential Impacts

Stream Sedimentation

Given the high water table on this property and the fact that most of the site topography drains into the Deep River Watershed, it will be difficult to control soil runoff from watercourses on this site during construction. Sediment runoff could negatively impact downstream areas of the Deep River that support fisheries resources. The negative impacts of sediment runoff have been well documented by researchers. Sediment will reduce populations of aquatic insects and fish by eliminating physical habitat while suspended sediments will reduce dissolved oxygen levels (Cordone and Kelley 1961). Suspended sediments may prevent successful nest development of trout (Bell 1986). As reported by Meehan (1991), sediment deposition can severely impact spawning substrate abundance and quality. Reductions in egg survival are caused by smothering, insufficient oxygen supply and lack of proper removal of catabolic products (Bell 1986). Meehan (1991) indicated that erosion and sedimentation of instream habitat could alter channel morphology by increasing the stream width-depth ratio, incidence and severity of stream bank erosion, channel braiding, and reduce pool volume and frequency.

Stormwater Pollution

A change in zoning would result in the conversion of pervious areas on the property to impervious surfaces. Maximum impervious surface allowance per local regulations is 75% of the total buildable area. This level represents some very intensive development on this parcel. Stormwaters that outlet to wetlands, ponds and watercourses can contain a variety of pollutants that degrade downstream water quality to the detriment of aquatic organisms (Klein 1979).

Pollutants commonly found in stormwaters include hydrocarbons (gasoline and oil), herbicides, heavy metals, road salt, fine silts, and coarse sediment. Nutrients, total phosphorous and total nitrogen in stormwater runoff fertilize stream waters causing water quality degradation. Additionally, fine silts in stormwaters that remain in suspension for prolonged periods often cannot be effectively removed from engineered stormwater detention basins and/or roadway catch basins. Accidentally spilled petroleum based chemicals or other toxicants cause partial or complete fishkills if introduced in high concentrations. Klein (1979) and Booth (1991) document that fish and aquatic community health declines significantly when impervious cover exceeds 10% in a watershed. Impervious cover greater than 25% represents extensive urbanization within a watershed such to the extent that stream water quality and fish community health precipitously decline after that point of development. First order headwater streams contained within subwatersheds, such as the environmental setting on this 330-acre parcel considered for development, have been found to be at particular risk to degradation from increases in impervious cover.

Thermal Loading

Thermal loading or increases in ambient surface water temperatures during the summer is a serious concern with any commercial development that results in the increase in the amount of impervious surfaces. Impervious areas act as a heat collector, with heat being imparted to stormwaters as they pass over impervious surfaces. In addition, stormwater temperatures can be elevated from solar radiation as they are collected and stored in detention basins that may be constructed as part of any commercial development. Surface water temperatures of downstream areas of streams are greatly influenced by temperatures of upstream headwaters. Given the presence of a native brook trout population in Deep River, a fish species with a thermal preference of 66°F or less (Bjornn and Reiser 1991), the influx of warm stormwaters can cause "thermal shock" and risk the possibility of fishkills.

Recommendations/Comments

The Town of Colchester should ensure that any future development of this 330-acre parcel would not negatively affect onsite stream and wetland resources and viable downstream fish resources within the Deep River Watershed. Both long term and cumulative environmental impacts need to be considered before rezoning this parcel from Residential-40 to Business Park and should be given equal consideration with future economic benefits. The following recommendations and comments are provided to minimize impacts to fisheries resources if the property is developed in the future.

Impervious Cover

Given myriad documented impacts to stream resources and health when amount of impervious cover exceeds 10%, it is recommended that the amount of impervious cover development on this parcel not exceed 10% of the total amount of buildable area.

Riparian Corridor Protection

It is the policy of the Connecticut Department of Environmental Protection Inland Fisheries Division that riparian corridors be protected with a 100-foot wide riparian buffer zone. A copy of this policy is available upon request. It is highly recommended that a 100-foot wide riparian buffer zone be maintained along the Deep River corridor on this property. A riparian buffer is one of the most natural mitigation measures to protect water quality and fisheries resources. No construction and alteration of existing habitat should be allowed in this zone. A riparian wetland buffer is one of the most natural mitigation measures to protect the water quality and fisheries resources of watercourses.

Erosion and Sediment Control Plan

Proper installation and maintenance of erosion/sediment controls is critical to environmental well being. This includes such mitigative measures as filter fabric

barrier fences, staked hay bales, and temporary sediment basins. With the proper precautions and maintenance, excessive erosion can be preventable. Land disturbance and clearing should be kept to a minimum. Exposed, unvegetated areas should be protected from storm events. The applicant and the local wetland enforcement officer should be responsible for checking this development on a periodic basis to ensure that all soil erosion and sediment controls are being maintained. In addition, the applicant should post a performance bond with the town to protect against possible soil erosion violations. Past siltation disturbances in Connecticut have occurred when individual contractors either improperly deployed mitigation devices or failed to maintain these devices on a regular basis.

Stormwater Management

The effective management of stormwaters and roadway runoff can be accomplished through proper design, location, and maintenance of stormwater detention and catch basins. Particular attention should be made to stormwater discharges that outlet to wetlands and watercourses to ensure that instream erosion is not accelerated. Maintenance is very critical. Catch basins should be regularly maintained to minimize eventual adverse impacts to aquatic resources. The use of sand and sodium chloride road salt to de-ice paved surfaces should be minimized.

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Klein, R, D. (1979) Urbanization and Stream Quality Impairment. Water Resources Bulletin 15(4) 948- 963.

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The Natural Diversity Data Base

The Natural Diversity Data Base maps and files regarding the project area delineated for the proposed regulation and zone change to "Business Park Zone" on 330 acres between Parum and Chestnut Hill Roads in Colchester, Connecticut have been reviewed.

We have historic records for *Aristida purpurascens (*Arrowfeather) from the general area of a "Route 16 Colchester Center, roadside swamp. Heavy clay soils." (Information from 1957 herbarium specimen). This species is listed as State Special Concern (R.CS.A. Sec 26-306). The habitat for this species is dry sandy and gravelly soils. A site survey by a botanist should be done to determine if the species is present in areas that would be affected, directly or indirectly, by proposed activities. Such survey(s) should he completed some time during August through October when the plant is best identified. A report summarizing the results of such survey should include habitat descriptions, vascular plant species with special notes on the presence or absence of the species in question and a statement/resume giving the botanist's qualifications. The report should be sent to our program botanist, Ms. Nancy Murray, CT DEP-C&NHS, 79 Elm Street, Hartford, CT 06106.

According to our information, there are known extant populations of *Terrapene carolina carolina* (eastern box turtle) that occur in the vicinity of this project site. Eastern box turtles require old field and deciduous forests habitats, which can include power lines and logged woodlands. They are often found near small streams and ponds, the adults are completely terrestrial but the young may be semi-aquatic, and hibernate on land by digging down in the soil from October to April. They have an extremely small home range and can usually be found in the same area year after year.

We also have records for State Special Concern *Lyceana expianthe* (bog copper), *Merycomyia whitneyi* (tabanid fly) and *Tabanus fulvicallus* (horse fly) from the bog area that is located at the northern part of Lake Hayward. There could be similar habitat types in the project area or watershed.

The Bog Copper is a fairly conspicuous butterfly that is associated with sphagnum bogs in Connecticut. The two flies were also collected at the northern end of Lake Hayward in the fen/bog habitat. Activities that alter the physical or chemical nature of the aquatic habitat, cause siltation or any source of pollution will be detrimental. Any work that will detrimentally impact associated sphagnum bogs will affect these species.

If favored habitat of the Eastern box turtle is going to be impacted or if the water quality is going to be impacted by this project then the invertebrate species may be affected. The DEP Wildlife Division recommends that an invertebrate biologist and herpetologist conduct surveys for these species. A report summarizing the results of such survey should include habitat descriptions, invertebrate and reptile species list and a statement/resume giving the biologist' qualifications. The Wildlife Division does not maintain a list of invertebrate biologists or herpetologists in the state. The results of these investigations should be forwarded to the Wildlife Division and, after evaluation, recommendations can be provided.

The Wildlife Division has not seen detailed plans of the project or proposed timetables nor made an on-site inspection of the area. Consultation with the Wildlife Division should not be substituted for on-site surveys required for environmental assessments. Please be advised that should state permits be required or should state involvement occur in some other fashion, specific restrictions or conditions relating to the species discussed above may apply. In this situation, additional evaluation of the proposal by the Wildlife Division should be requested.

Natural Diversity Data Base information includes all information regarding critical biological resources available to us at the time of the request. This information is a compilation of data collected over the years by the Natural Resources Center's Geological and Natural History Survey and cooperating units of DEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substitutes 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.

Also be advised that this is a preliminary review and not a final determination. A more detailed review may be conducted as part of any subsequent environmental permit applications submitted to DEP for the proposed site.

Archaeological and Historical Review

The Office of State Archaeology (OSA) and the State Historic Preservation Office (SHPO) both note that the "Business Park" project area possesses moderate-to-high sensitivity for prehistoric and historic archaeological resources due to its proximity to Dutton Swamp and its agricultural soils. If and when the proposed regulations and zone changes are incorporated, they recommend an archaeological survey prior to any land use operations associated with the proposed industrial park development. Their offices are available to further review any development plans for the town when they are proposed.

In regard to proposed zoning regulations, the OSA and SHPO further recommend that the town's Conservation and Planning and Zoning Commissions consider the development of regulations to review cultural resources in an effort to preserve Colchester's archaeological and historic sites in their land use decision-making capabilities. Their offices maintain comprehensive site files and maps of all known archaeological sites in the state, including 20 sites in town representing Native American camps dating to over 7,000 years ago and I8[11] century Colonial-era farmsteads.

The Office of State Archaeology and the State Historic Preservation Office can provide the Commission with models from other municipalities which have enacted cultural resource regulations, including the neighboring town of East Haddam. These regulations can establish a review process for the protection of the town's cultural heritage. For specific information on model municipal regulations, please contact Dr. Nick Bellantoni, CT State Archaeologist, Office of State Archaeology, U-1023, UConn, Storrs, CT 06269-1023; (860) 486-5248. They would be pleased to work directly with commission members and town officials in developing regulations that arc best suited for Colchester's historical heritage.

Planning Review

The following comments and recommendations are based both on the information supplied by ERT coordinator and this Team member's conclusions derived from walking the site. In addition, also reviewed were the following material: Soil Survey of New London County (June 1983), 1962 and 2000 Aerial Photos, CT DEP; USGS Topography, Colchester Quadrangle photo-revised 1984; Geological Quadrangle Map, Surficial Geology, Colchester Quadrangle 1978; Ground Water Availability Map, CT DEP, 1978; Town of Colchester Plan of Conservation and Development, 2001; and the Town of Colchester Zoning Regulations.

The parcels in question constitute approximately +350 acres of residentially zoned land (R-40) between Routes 2, Route 354 (Parum Road) and Chestnut Hill Road. The site is located a few hundred feet from two separate Route 2 interchanges. All of the information gathered to date points to the environmentally sensitive nature of this area (wetlands/water resources/wildlife habitat). For the most part the area is heavily forested with the exception of approximately 6 acres that appear to have been historically used for hay. The primary soil type is Woodbridge with typical seasonal high ground water. This high ground water table was evident during a site visit to the area. The area also contains two primary wetland systems, which bisect it in a north-south direction. The land is situated just northeast of the Dutton Swamp, which includes a section with course-grained stratified drift, identified as an unconsolidated aquifer, with a potential yield of 50-2000 gallon per minute. While these conditions are contained within and/or adjacent to the site, they are similar to two other wetlands systems that are located to the east where substantial residential development has already encroached upon them.

While the conflict between economic development and natural resource protection is clearly evident, a potential avenue for reconciliation is to assume that this property will be developed in some manner, but that as a condition of development, it will be severely constrained by natural resources. The land is presently zoned Residential (R-40). Consequently, the property could be developed into 40,000 square foot residential building lots. Any evaluation of impacts resulting from development must begin at this point. Under the existing zoning regulations, an applicant could apply for, and receive, approvals from various agencies to cross wetlands, construct utilities (well, septic, sewer, power) and build roads (cul-de-sacs or thru-streets) under the present regulations. Other than the permit requirements for wetlands, residential use is permitted as of right. Therefore, it must be assumed that the present zoning classification already has a host of potential impacts on the natural resources and these must be weighed against potential impacts resulting from non-residential uses.

Thus far, the stage has been set by residents and commission members who appear to have reacted to the potential development impacts of this parcel only as a business park, apparently ignoring, minimizing or dismissing the impacts inherent in higher density residential development. The new focus of the area as a business park was driven by its identification in the Town's 2001 Plan of Conservation and Development (POCD). To accommodate this new use, the POCD also targets the land as a future service area for public water and sewer in the Town's POCD. Supporting the designation as a business park is the fact that the property has exceptional access to Route 2. Although the majority of the land is presently enrolled in the Town's PA 490 program for tax purposes, that classification does not hinder the property's future development potential.

In conducting an analysis of the site, other areas which have similar characteristics to the elements contained in this site were researched (i.e. parcel(s) size, environmental constraints, highway/local access). As example,

following is a copy of an aerial photo that shows an area of Marlborough, Massachusetts, a town located just north of the Massachusetts Turnpike along the Interstate 495 corridor. This photo illustrates two types of ostensibly competing land uses (residential and business park/office). This photo also shows the comparative area of land required to sustain each particular type of development; approximately 150 homes consumes about the same land area as an office complex in excess of 500,000 square feet.

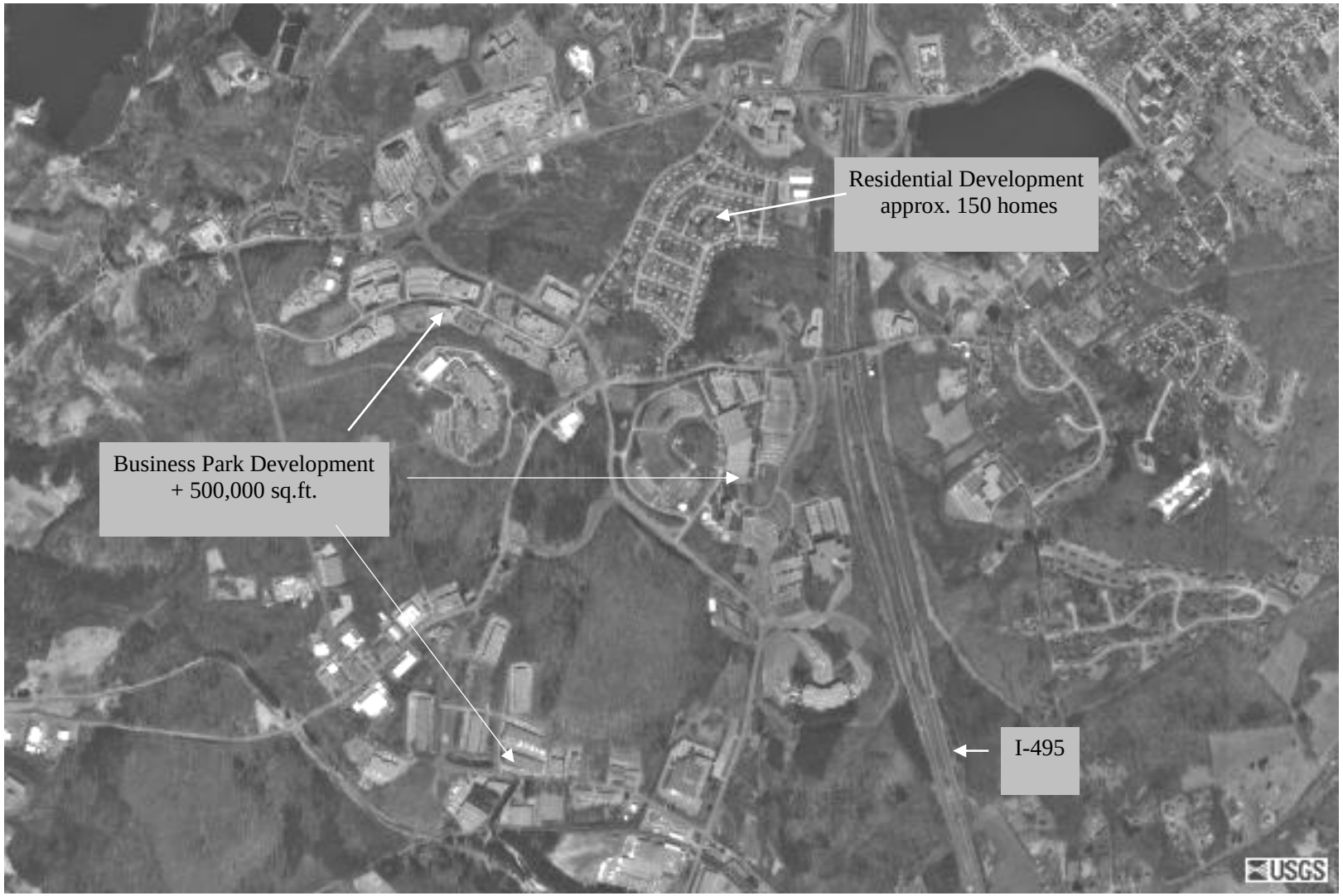
Closer to home, a examination of a current aerial photo (following) of the land bounded by Route 2, 354 and Kramer Roads #1 and #2 clearly depicts the peripheral infringements of residential development bordering the proposed Business Park. This aerial photo clearly demonstrates that the very same natural systems contained in the proposed area of the Business Park are already under extreme pressure from creeping residential development. Given these examples, it is felt by this reviewer that the remaining Colchester property, if developed for a business park, can be developed in a non-residential manner with less net adverse environment impact then would otherwise be the case if residential development continued to occur randomly. However, modifying existing regulations to accommodate these non-residential uses is not recommended. Instead, it is recommended that a new set of regulations be developed focused on the unique characteristics of this site.

In any instance, Colchester should attempt to identify potential development impacts (buildout) for this area. If the Town entertains the notion of rezoning this area for non-residential uses, it should look at the latest technology for the following conditions: density and impervious surface impacts; environmental setbacks (riparian buffers to wetlands and other resources); storm water management (NEMO and other sources); fertilizer and pesticide management; impervious surface impacts; road design (width, pavement, maintenance, snow removal); traffic management; winter road maintenance (salt application verses calcium chloride verse sand only); development in nodes and/or pods (Cluster

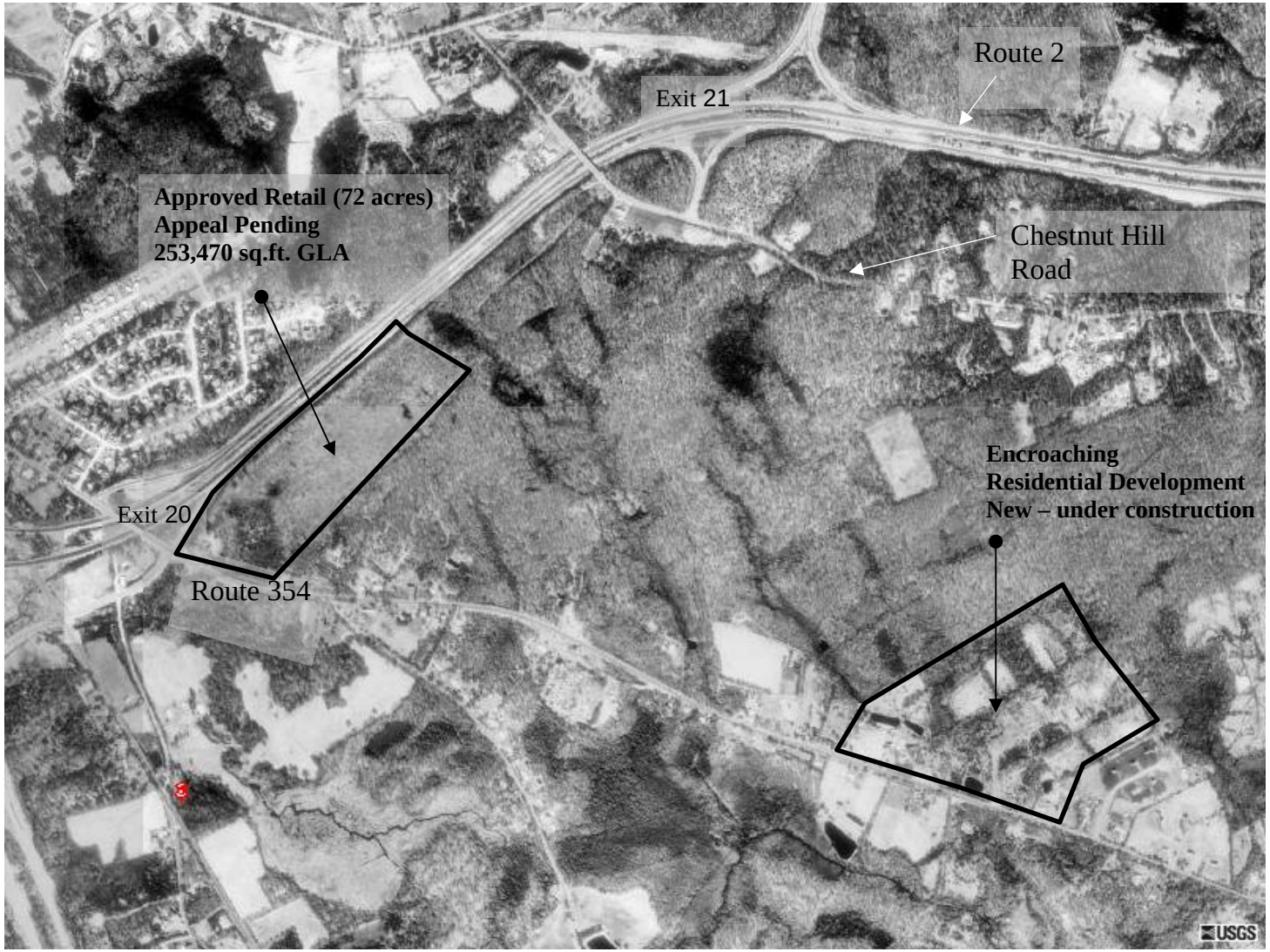
notion for Business Parks). It is important to note in this respect that as a function of improved technology local land use and development regulations are constantly evolving and changing to reflect these advances.

Finally, it is recommended that special regulations be developed to meet the particular needs of this site in order to insure an appropriate balance between development and environmental protection. Although an evaluation of the area's general economy and a town's ability to attract a certain type of develop is somewhat unpredictable, technology and infrastructure costs associated with the development of this area could exceed potential return on investment. In this context it is quite conceivable that this area will actually be land-banked until the cost of development (acquisition, infrastructure design and construction, permitting, and carrying costs etc.) are in line with return on investment. Whether this land remains residential or is rezoned non-residential, the Planning and Zoning Commission should continue to evaluate this area and consider regulation changes to the Town's existing regulations which take into consideration the sensitive nature of this area.

1995 Aerial Photo – From Marlborough, Massachusetts



1991 Aerial Photo – From Colchester, Connecticut



Transportation Review

Access to Proposed Site

The subject 330-acre site, currently zoned R-40, is located between Parum Road (Route 354) and Chestnut Hill Road, just south of Route 2. Route 2 is a four-lane expressway that can be accessed by way of ramps from Route 11, Route 354, Route 616 and Chestnut Hill Road near the subject area. Direct access points to the subject site are available along Route 354 and/or Chestnut Hill Road.

State Route 354 is a two-lane major collector roadway, which generally has low traffic volumes. Route 354 is directly accessible from Route 2 westbound by the way of Interchange 20. In the eastbound direction, Route 354 is accessible from Route 2 by the way of Route 11. Interchange 6, at Route 11, directly accesses Route 637 (Lake Hayward Road), which is linked to Route 354.

An access point to the subject site from Route 354 would likely require roadway modifications, including widening for turn lanes and the probability of traffic control signals. The Connecticut Department of Transportation (ConnDOTs) design standards recommend that any new intersections along State Roads have a minimum 400-foot separation between them to insure acceptable traffic operations. In addition, Route 354 is a designated bike route; therefore, a minimum of 5-ft shoulders has to be maintained. There are no State roadway improvements currently programmed for this roadway.

Chestnut Hill Road is a two-lane local road that serves a light residential area. Just northeast of the subject site, on Chestnut Hill Road, is the terminus of Interchange 21 from Route 2 eastbound. Interchange 21 has a buttonhook configuration in which the entrance and exit points are adjacent. An access point across from this interchange, at Chestnut Hill Road, could provide direct access to the subject site. Improvements to Chestnut Hill Road at the terminus of the ramp may be necessary to accommodate

additional traffic volumes. Access would also be available to the subject site from Route 2 westbound at Interchange 21 through Route 616 and Chestnut Hill Road.

Proposed Retail Development Adjacent to Site

A permit application has been filed with the State Traffic Commission (STC) for a 255,000 square foot (sq.ft.) retail development, located on the south side of Route 2, just west of the subject site. Traffic generation from the development will require several improvements to be made to State roadways in the immediate vicinity. The access driveway to the development is proposed on the north side of Route 354, approximately 800 feet east of the intersection of Route 354, the Route 2 eastbound on-ramp and Route 637. Roadway modifications would require a traffic control signal at this intersection, as well as the driveway. In addition, roadway widening at 3 legs of this intersection would be required. (See following figure). Route 354 at the Route 2 westbound off-ramp would also be widened to provide an exclusive left-turn lane.

Site Development - Roadway Construction

From the review of mapping for the 330-acre site, supplied by the Town, it is apparent that wetlands are present within the site. Moreover, the soil type within this area is predominately Woodbridge. Limitations to development in this type of soil are slow water permeability in the substratum and a seasonal high groundwater table. Reportedly, the average high groundwater table is approximately 20" below ground surface.

Roadway construction in this area is possible; however, will require special construction techniques. Woodbridge soils are organic. Organic soils are typically highly compressible (which could lead to settlement problems) and have low shear strengths (which could lead to embankment stability problems). It is anticipated that standard embankment construction on this soil is not feasible. Possible alternatives

include removal of the organic soils prior to embankment construction, use of a bridge/viaduct on a deep foundation over the organic deposit, use of lightweight materials in construction of the embankment, etc. Feasibility and evaluation of the various alternates would need to be made upon completion of a subsurface investigation in which the depth, limits, and soil characteristics of the organic deposit would be determined.

Inland wetland permitting would be required at a minimum for roadway construction. The use of Best Management Practices to minimize impacts during construction would be required. Buffer areas between wetlands and developments are recommended, as well as detention/retention basins and specialized drainage structures to minimize impacts on wetlands and groundwater quality.

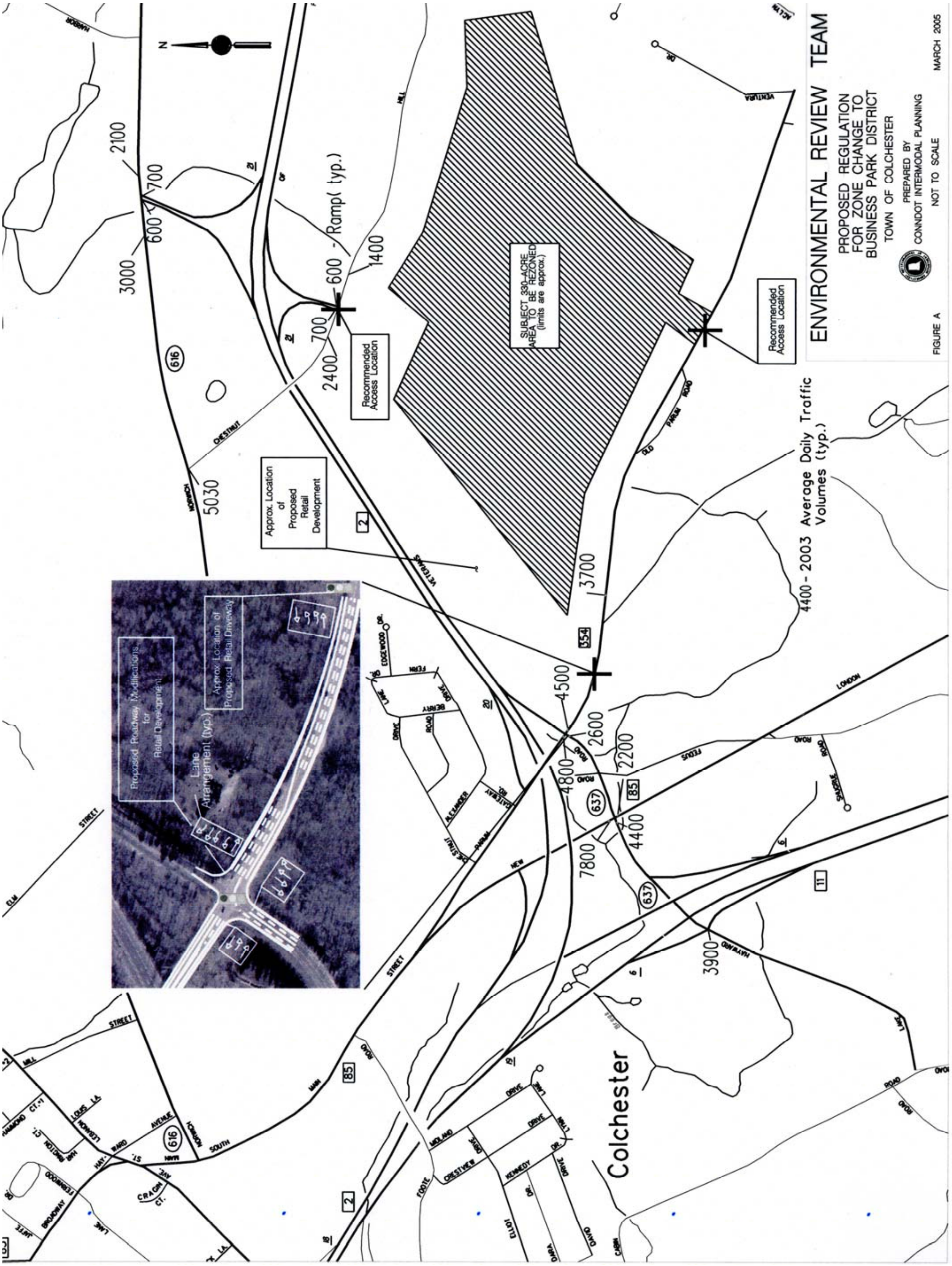
Potential Traffic from Rezoned Site

The 2003 average daily traffic (ADT) volumes for State Routes and ramps within the vicinity of the subject site are shown in the following figure.

Reportedly, approximately 90 acres of the available 330 acres are developable. The Town's zoning regulations require a minimum lot size of 40,000 sq. ft. for development in a Business Park District. At full development, site-generated traffic may potentially triple the ADT volumes in this area. These volumes do not include traffic from a retail development. According to Colchester's zoning regulations, retail development in a Business Park District would require special permitting and could not be over 200,000 sq. ft.

Recommended access locations to the subject site are also shown in the following figure. These are access locations for main roadways into the site. Zoning regulations prohibit direct access to developments from roads not internal to the proposed Business Park District.

Developers seeking building permits for new developments with a minimum gross floor area of 100,000 sq. ft. or providing 200 parking spaces having access on a state highway, abutting a state highway, or substantially impacting state highway traffic must get approval from the State Traffic Commission (STC). The STC process would control the impacts of site-generated traffic from potential new developments on State routes in this area.


ENVIRONMENTAL REVIEW TEAM
PROPOSED REGULATION
FOR ZONE CHANGE TO
BUSINESS PARK DISTRICT
TOWN OF COLCHESTER
PREPARED BY
CONNDOT INTERMODAL PLANNING
NOT TO SCALE
FIGURE A
MARCH 2005
SUBJECT 330-ACRE
AREA TO BE REZONED
(limits are approx.)
Recommended Access Location
Recommended Access Location
Approx. Location of Proposed Retail Development
4400 - 2003 Average Daily Traffic Volumes (typ.)
Ramp (typ.)
Proposed Roadway Modifications for Retail Development
Lane Arrangement (typ.)
Approx. Location of Proposed Retail Driveway
Colchester

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, active adult, 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 and/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 Conservation District and the ERT Coordinator. A request form should be completely filled out and should include the required materials. When this request is reviewed by the local Conservation District and approved by the ERT Subcommittee, 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.