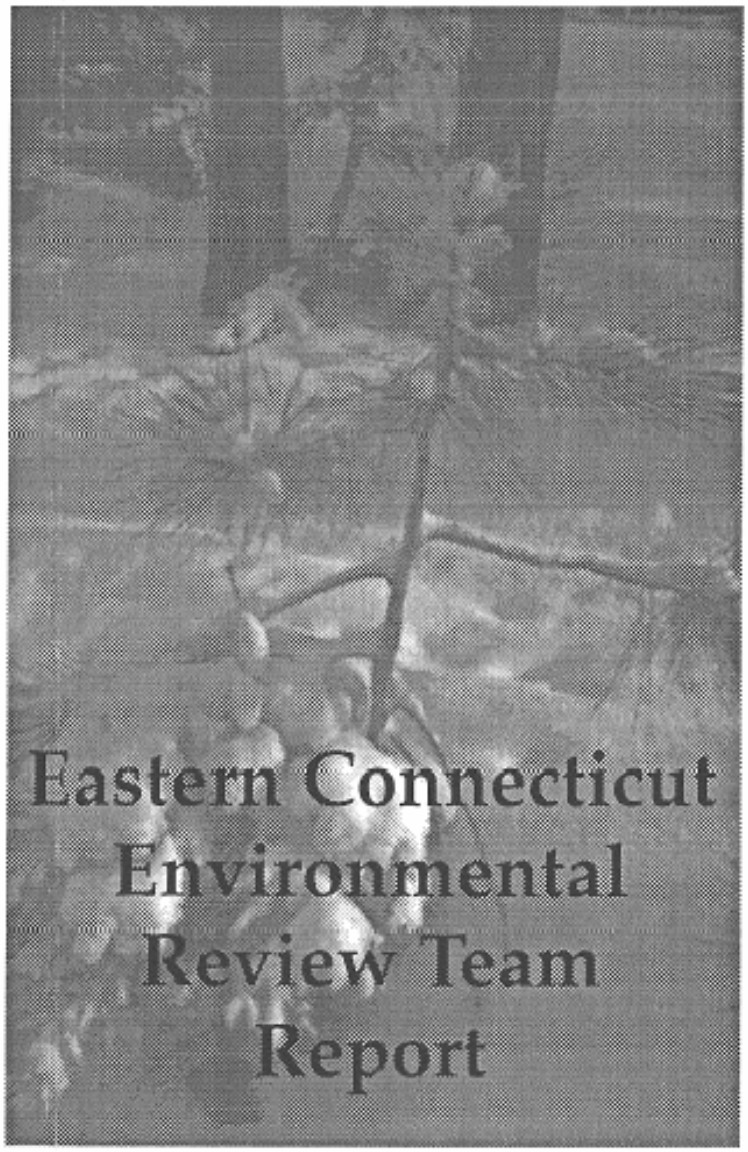
Proposed Zone Change

Exit 93 Commercial Area Expansion

Killingly, Connecticut



Eastern Connecticut
Resource Conservation and Development Area, Inc.

Proposed Zone Change
Exit 93 Commercial Expansion
Killingly, 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
Town Council
Killingly, Connecticut

February 2004

Report No. 583

CT Environmental Review Teams
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ACKNOWLEDGMENTS

This report is an outgrowth of a request from the Killingly Town Council to the Eastern Connecticut Conservation District (ECCD). The ECCD 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 7, 2004.

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I would also like to thank Linda Walden, director of planning and development, Delia Fey, planner I, David Capacchione, assistant town planner and Elsie Bisset, economic development coordinator, 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 maps and information. 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 and existing development, and also suggests considerations that should be of concern to the town and landowners. 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 reviewing the proposed zone change from rural residential to commercial.

If you require additional information please contact:

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INTRODUCTION

Introduction

The Killingly Town Council has requested assistance from the Eastern Connecticut Environmental Review Team in conducting a review of a proposed zone change from low density residential and rural development to general commercial.

The Town of Killingly is the applicant for approximately 378 acres and there is a private applicant for an additional ±8 acres located northeast of the intersection of Routes 12 and 101 and just east of Interstate 395. There is an established general commercial zone at I-395 interchange 93 which serves the town and travelers on the interstate.

The study site consists of 34 parcels with over 20 owners. Although the majority of the land is vacant, 18 properties contain residences/buildings. The Town of Killingly has owned a 72 acre parcel since the late 1800's. There is public sewer and water available to the area.

Objectives of the ERT Study

The Town of Killingly through the Town Council has requested assistance in evaluating the proposed zone change by providing environmental information and recommendations. Major concerns include: physical suitability of the land, soils limitations, impacts to wetland systems, stormwater concerns, traffic and access issues, identification of sensitive areas to protect, and overall land use guidelines.

The ERT Process

Through the efforts of the town council this environmental review and report was prepared for the Town of Killingly.

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 town and 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 7, 2004. Some Team members may have made conducted a site visit on a different day. 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.

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Location Map

Scale 1" = 2000'

Aerial Photo

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Aerial Photo

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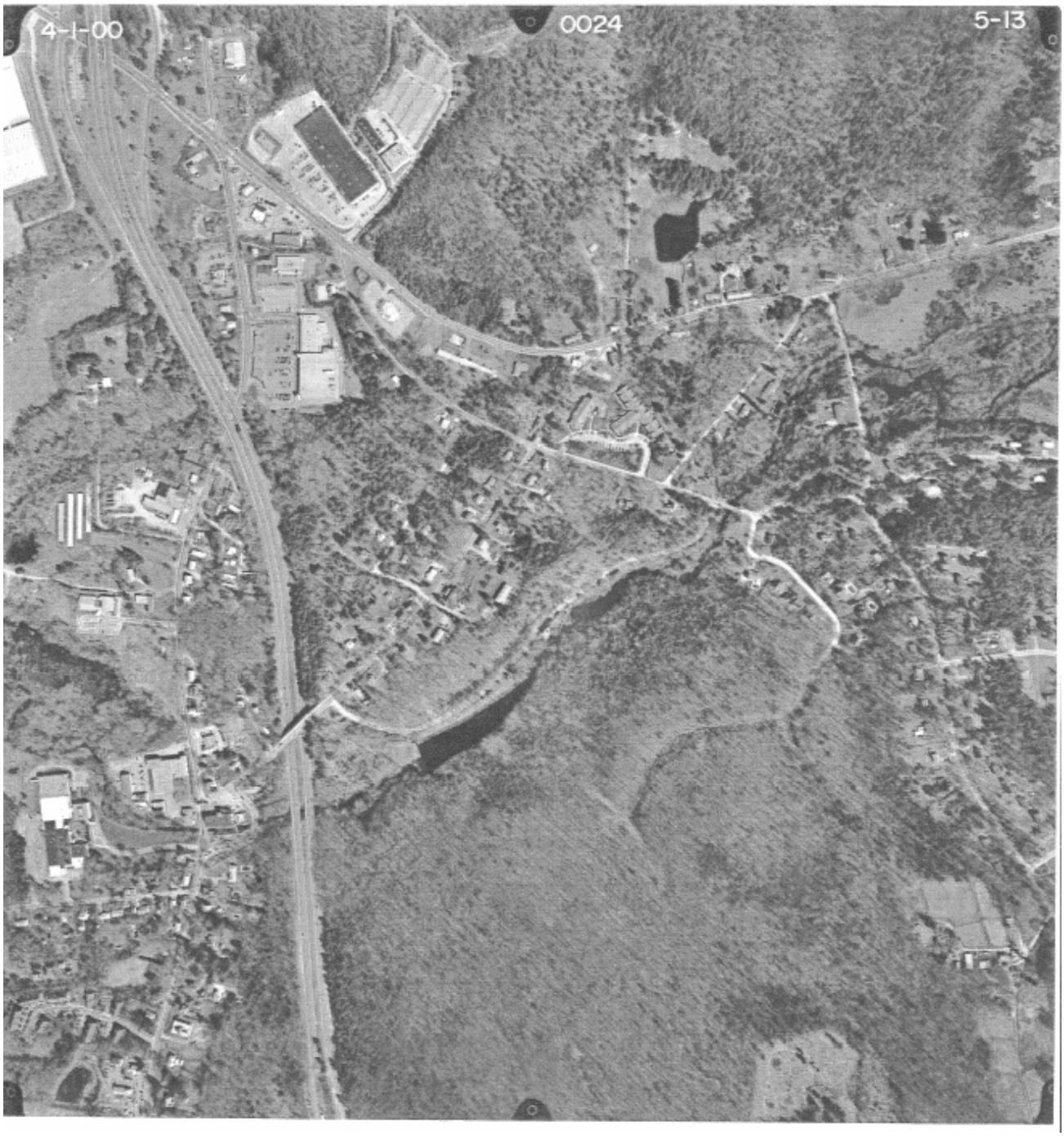

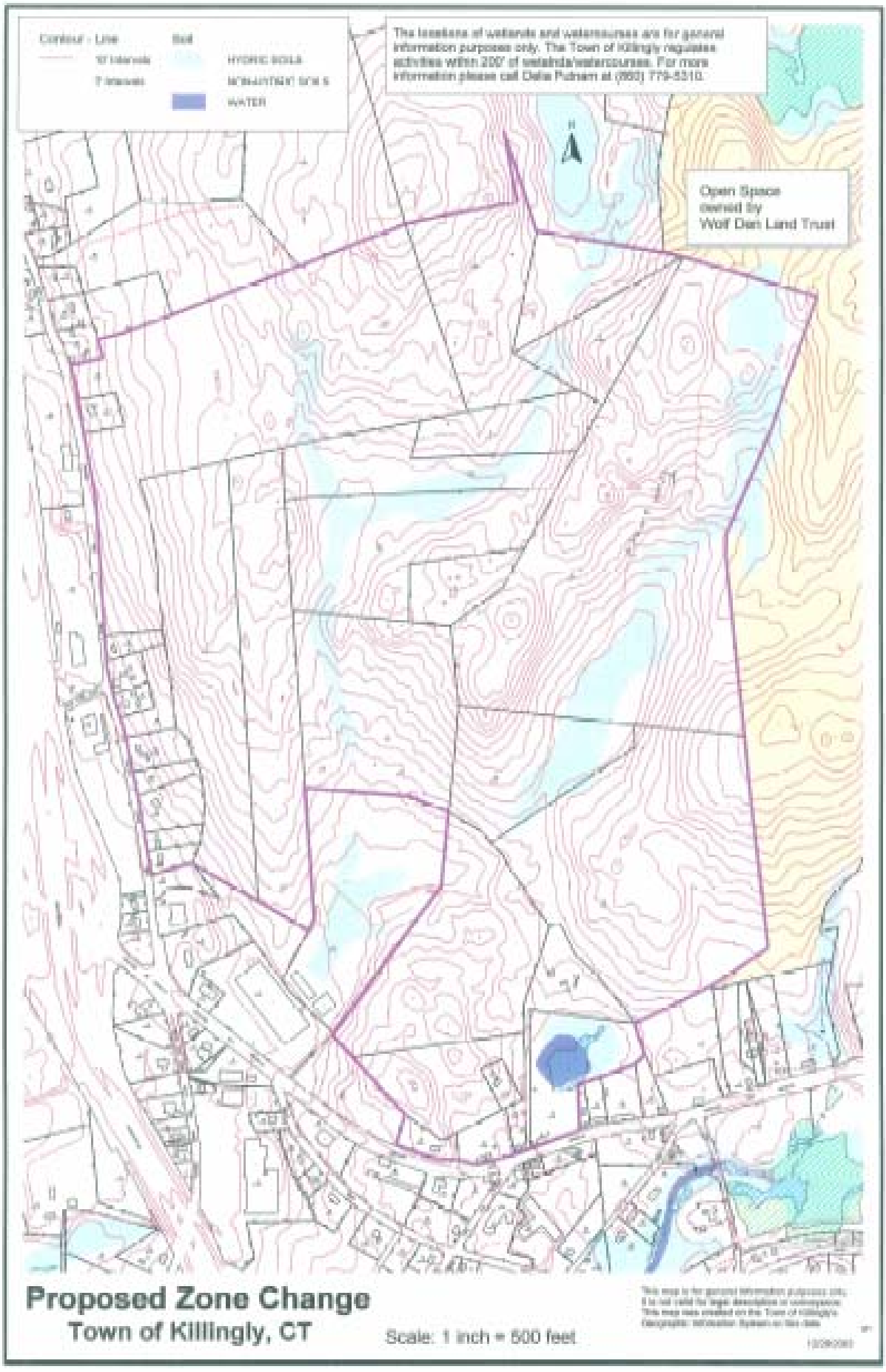
Contour - Line
10' Intervals
5' Intervals
Soil
HYDRIC SOILS
WATER
The locations of wetlands and watercourses are for general information purposes only. The Town of Killingly regulates activities within 200' of wetlands/watercourses. For more information please call Celia Putnam at (860) 779-5310.
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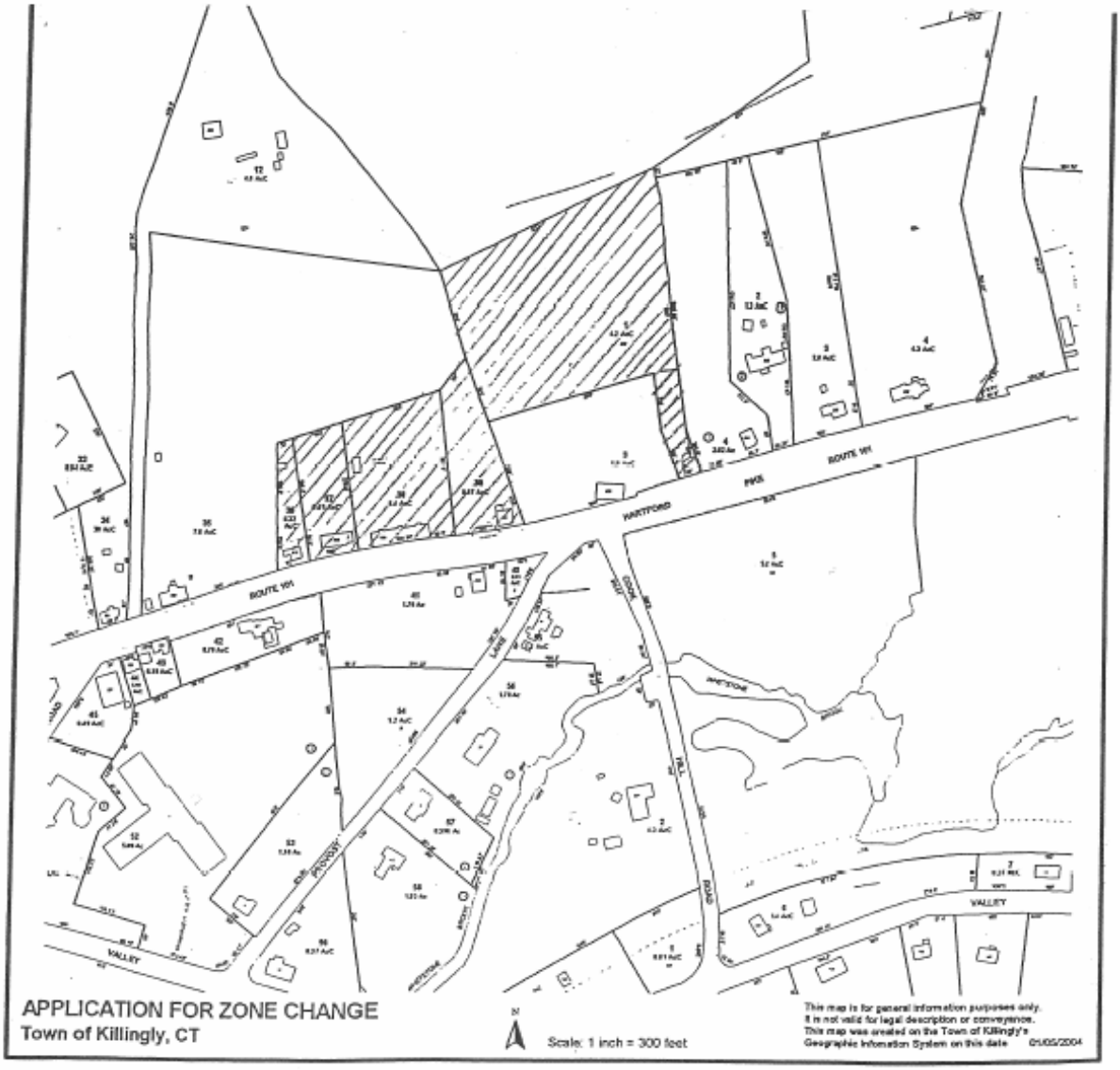
Open Space
owned by
Wolf Den Land Trust
Proposed Zone Change
Town of Killingly, CT
Scale: 1 inch = 500 feet

Proposed Zone Change
Private Applicant



= Subject of Application

GEOLOGY

The Town of Killingly has proposed to change the zone designation to commercial for approximately 378 acres comprising about a dozen larger parcels and numerous smaller parcels located near the intersection of state routes 101 and 12 and I-395. The land proposed for the zone change is well-situated with regard to local infrastructure (socioeconomic: accessible transportation-wise, favorable demographics), but physical characteristics of the land are not as favorable and will impose development constraints. The area is located in hilly terrain that everywhere has moderate to steep slopes. It is poorly covered by glacial soils which are thin or absent. Bedrock, granitic gneiss, has numerous foliation-parallel fractures dipping toward the west-northwest and also steeply dipping fractures and is likely a recharge area for the bedrock aquifer west of the parcel. Lack of soils will make grading difficult.

Topography

The area is hilly with local relief of 1-200 feet. Elevations range from approximately 260 feet to 566 feet, and total relief is more than 300 feet in an area that is about 3500 feet wide (East to West) and a mile long (North to South). Slopes are mostly moderate (5-15 degrees) although some are steep (greater than 15 degrees). Such topography is not undevelopable but will require extensive grading. West of the proposed area the land drops off into a broad valley occupied by the Quinebaug River and partly by the Five Mile River. The valley bottom elevation is near 250 feet. The topography of the hills is greatly influenced by the structure of local bedrock. The hills are oval-shaped in a North-South direction, a reflection of the rock structure and foliation.

Surficial Geology

Soils in this area were produced by glacial erosion and deposition when the glaciers that passed over this area during the last Ice Age melted about 12 -14000 years ago. The debris left behind, a poorly sorted mixture of mud, sand and gravel (including local boulders) called till, is common to the highlands of all of Connecticut. In places it may be a 10-20 foot thick mantle covering the local bedrock. In this part of Killingly, however, there is very little till. Bedrock out crops and loose blocks of bedrock abound. The field observation only sampled about 40% of the area, so possible till covered hills may exist along the northern and eastern edges of the proposed area.

Rather extensive deposits of sand and gravel are found in the valley west of the proposed area (Randall and Pessel, 1968) and very small quantities of sand and gravel may underlie the southwestern corner of the area. The sand and gravel was deposited by glacial melt-water streams that flowed down the valley during the last of stages of glacier melting.

Bedrock Geology

Bedrock underlying the area is composed of granitic gneisses having slightly different mineralogic compositions and a weak westerly-dipping foliation. They are approximately one billion years old or Proterozoic in age (Moore, 1983; Rodgers, 1985) and initially formed on a small (micro)continent called Baltica and is part of Avalon Terrane.

The youngest, referred to as the Ponaganset Gneiss (Zp on map), occupies an area roughly down the middle of the proposed area and has intrusive relations to the other two gneisses. It is light gray, medium- to course-grained and is porphyritic (porphyroblastic). It is composed of equal amounts of quartz, potassium-feldspar,

and plagioclase feldspar with biotite and rare hornblende. It was probably intruded as a granite into the older rocks, which may have been metamorphic at the time of intrusion.

An oldest rock, the Plainfield Formation (Zpq on map; this was not observed during the field observation) was intruded by the Ponaganset gneiss body. It's foliation parallels composition bands and appears to dip below the Ponaganset Gneiss and presumably the Scituate Gneiss. It contains abundant quartz (locally is quartzite) and probably originated as a sedimentary rock during the Proterozoic Era.

The Scituate Gneiss (Zs on map) is pinkish gray to gray and medium- to coarse-grained. It is a quartz-monzonite composed of quartz, pink potassium feldspar and white sodium feldspar (plagioclase) with minor amounts of biotite.

Younger rocks are exposed to the west of the Quinebaug River. They are well layered and dark gray to greenish and are Paleozoic in age. They were initially formed as sedimentary and volcanic rocks offshore of the ancient North American continent and arc referred to as Iapetus Terrane (Dixon, 1968; Bell, 1985, Ch. 8; Rodgers, 1985).

The two terranes (Avalonia and Iapetus) became juxtaposed about 350 million years ago by plate tectonic processes. The Avalonian rocks were thrust under Iapetus rocks. The boundary is a major discontinuity called the Lake Char Fault (zone) in eastern Connecticut and the Honey Hill Fault (zone) in southern Connecticut (actually one discontinuity with two names). The two fault zones (both currently inactive) join in North Stonington. The plate tectonic activity involved with the juxtaposition of the two terranes produced a huge mountain range (since eroded) and caused earthquakes and either the metamorphism or remetamorphism of the rocks of both terranes. The Quinebaug River Valley roughly follows the Lake Char Fault Zone because the rocks in the fault zone are

more highly fractured and hence easier to erode. Glaciers during the last Ice Age excavated the valley that the river uses today.

Impact on Development

The zone change proposed is presumably to attract large (in terms of square footage) commercial developments such as a retail mall or a large "box" general merchandise or home improvement retail outlet. Both require large parking areas. Herein lie the problems as this reviewer sees it.

Large parking lots and buildings are normally constructed of impermeable materials. Rain water and snow melt will not naturally infiltrate and recharge the fresh water bedrock aquifers of the area, especially to the west. These construction materials will be designed to quickly divert storm and snow-melt off the roofs and parking areas and away from the immediate area, usually into local streams that eventually make their way to Five Mile River and the Quinebaug River, increasing storm flow rates in these rivers. In addition, potential pollutants such as road salt, sand, and oil, can make their way into the rivers, possibly contributing to riparian degradation downstream in the watershed.

The buildings and parking areas for such development generally are placed on flat or gently sloping land. If the land is not naturally flat or gently sloping it is graded prior to construction. The area chosen will be difficult to grade because of the bedrock at or close to the surface. Grading cannot be done with just earth moving equipment (bulldozers etc.). Extensive blasting will be required to flatten the natural topography. Essentially quarries will have to be opened to flatten the high elevations and provide fill for the lower elevations. At least the shock of dynamite blasts may improve fracture permeability of the local bedrock.

References Cited

Bell, Michael, 1985, *The Face of Connecticut*. Connecticut Geol. And Nat. Hist. Survey, Bull 110, 196p.

Dixon, H.R., 1968, Bedrock Geologic Map of the Danielson Quadrangle, Windham County, CT. U.S. Geol. Surv. Map GQ 696.

Moore, G.F,., Jr., 1983, Bedrock Geologic Map of the East Killingly Quadrangle, CT and RI. U .S. Geol. Surv. Map GQ 1517.

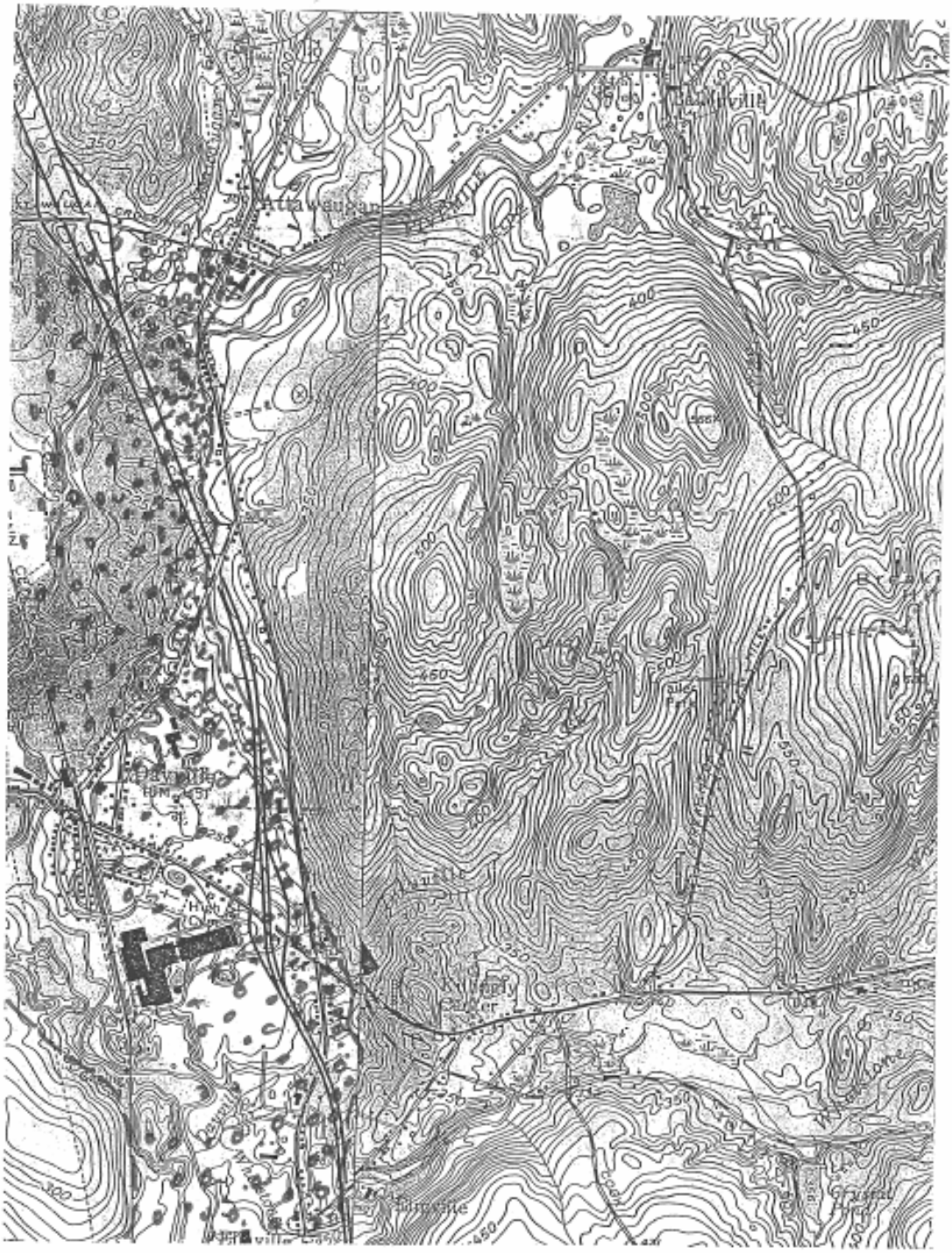
Randall, A.D., and Pessel, F., Jr., 1968, Surficial Geologic Map of the Danielson Quadrangle, Windham County, CT. U.S. Geol. Surv. Map GQ 660.

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

Surficial Geologic Map

(in part from Randall and Pessel, 1968)

Stippled area has stratified sand and gravel at surface, remaining area has thin till or exposed bedrock at the surface.



Bedrock Geologic Map

(after Dixon, 1968; Moore, 1983; and Rodgers, 1985)

Zp	-	Ponaganset Gneiss
Zs	-	Scituate Gneiss
Zpq	-	Plainfield Formation
Zh	-	Hope Valley Alaskite Gneiss (immediately south of area)
Oq	-	Quinebaug Formation

Conservation District Comments and Review

Recipients of this report should be aware that tract of land in question is +378 acres, and the ERT inspection route was a loop through the inner portion of the property, covering only 10% to 20% of the tract. Also, the report is constrained because there is no knowledge of actual development plans for the site. If the zoning is changed, a thorough investigation will be necessary before deciding on actual commercial development plans.

This section of the report includes:

- General description of the land and its suitability for commercial development.
- General evaluation of the potential for successful forest management.
- Soils Map
- Evaluation of soils

General Description

The terrain is typical for the region: Forested, rolling hills, with some relatively flat areas, and stone walls indicating that much of the land was cleared for agriculture in the past. There are some ledge rock outcroppings, boulder-strewn areas, watercourses, wetlands, and at least three ponds. Over most of the property, the elevation change from the low areas to the higher ground is approximately 200 feet.

Given proper protection for the wetlands and waterbodies, (with bedrock issues being an unknown), this inspection did not reveal any major impediments to

commercial development of the property. However, as a conservation organization, ECCD submits the following for consideration:

The property is a valuable natural resource and should not be given up to commercial development without serious consideration. The property is currently undisturbed open space and wildlife habitat, having recovered from historical use as agricultural land. Much of the neighboring property is similar, providing a large contiguous area of wildlife habitat and open space. There are ATV trails present, but for the most part, the property experiences minimal human encroachment.

Should the property be developed, ECCD strongly recommends that a generous portion of the property be set aside permanently as open space.

Should the property be developed, ECCD strongly recommends that generous buffers be permanently established to protect the wetlands, watercourses, and ponds. Presently the water quality appears to be very high. The Town can allow development, but require that the pre-development level of water quality be maintained after development.

Management for Forest Resources

The forest is generally healthy, however the growth rates appear to be slow, and the growth forms (from a timber-production standpoint) are moderate to poor. These factors indicate that this site probably will not produce quality trees for timber harvest in an economically acceptable time frame.

The forest is predominantly made up of timber species, however little high-quality timber was observed. With regard to size, some trees have reached marketable size, but to get a reasonable return on a harvest, the trees would need

to be considerably larger. To improve future production, the forest could be culled. However, the landowner would likely have to pay for that service, and there would also be mechanical damage to the forestland as a result of that activity. The landowner would need to decide if the cost of culling and the damage to the forest are worth the possibility of improved timber quality at some future time.

The forest does appear to be well suited for wildlife habitat and human outdoor recreation activities such as hiking and hunting.

Considerably more investigation is needed to confirm these general observations.

Details:

- Type: Predominantly mixed hardwoods; major species: oak, maple and hickory. Also present is a scattering of white pines.
- Size: The sizes of almost all of the trees ranged from 6" to 24" dbh (Diameter at Breast Height), with most of the trees falling in the 8" to 16" dbh range.

Soil Map for proposed zoning change

Soils Map

Soils Map

Red diagonal lines indicate soils with slopes greater than 15%.

Black diagonal lines indicate map units which have, as a component, soils that are shallow to bedrock or bedrock outcrops.

Shades of blue indicate wetlands

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This map is for general informational purposes only. It is not valid for legal descriptions or conveyance.

Soils Evaluation

Below you will find a soils analysis of the Killingly rezoning site based on data from the State Soil Survey updated as of 2/27/2002. Except in the case of wetland soils, the proposal to change the zoning to allow commercial development is not incompatible with the soils.

Tables are shown for five use criteria of the soils as defined by the Natural Resource Conservation Service (NRCS). The five tables include: 1) analysis of the hydric rating of the soils, 2) the water table, 3) their suitability for small commercial buildings, 4) their use as a gravel source for on or off site, and 5) their septic system suitability. Limitations based on these intended uses are shown. Other limitations exist for these soils but were eliminated as not relevant for intended commercial development. **All limitations can be overcome but will add expenses and time to construction projects.** It should be noted that the map above has soils listed by a map symbol identification number. If you wish to know the corresponding name of that soil you will find it in the tables below. Some of the soils have no limiting uses (for the five criteria described below) and so will not be found in any of the tables below.

Mapunit Hydric Rating

A hydric soil is a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. Hydric soils along with hydrophytic vegetation and wetland hydrology are used to define wetlands.

Map Color Symbol	Map Symbol	Soil Name	Rating
	3	RIDGEBURY, LEICESTER AND WHITMAN SOILS, EXTREMELY STONY	All hydric
	13	WALPOLE SANDY LOAM	All hydric
	18	CATDEN AND FREETOWN SOILS	All hydric

Water Table

The depth to the water table as defined by the NRCS is the depth to the "wet" soil. It is essentially the depth to the point at which the soil pores are completely saturated for a given period of time each year. An exact description by the NRCS follows:

Water Table is the depth to soil moisture status wet. Soil moisture status is the mean monthly soil water state at a specified depth. The water state classes used in soil moisture status are dry, moist, and wet. Water Table (Rating) is the depth to the first layer where soil moisture status is wet. This status is based on three classes of dry, moist, and wet based on mean monthly class data.

Map Color Symbol	Map Symbol	Soil Name	Rating (cm to depth)
	3	RIDGEBURY, LEICESTER AND WHITMAN SOILS, EXTREMELY STONY	8
	13	WALPOLE SANDY LOAM	15
	18	CATDEN AND FRESTOWN SOILS	10
	21A	NINIGRET AND TISBURY SOILS, 0 TO 5 PERCENT SLOPES	61
	23A	SUDBURY SANDY LOAM, 0 TO 5 PERCENT SLOPES	69
	47C	WOODBRIDGE FINE SANDY LOAM, 2 TO 15 PERCENT SLOPES, EXTREMELY STONY	61
	52C	SUTTON FINE SANDY LOAM, 2 TO 15 PERCENT SLOPES, EXTREMELY STONY	61
	306	UDORTHENTS-URBAN LAND COMPLEX	122

Small Commercial Buildings

Small commercial buildings are those buildings that are less than three stories without basements. The foundation is assumed to be spread footings of reinforced concrete at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper.

The limitations are considered not limiting if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome. A somewhat limiting limitation indicates soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations. **A very limiting limitation indicates soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are very limiting.**

Map Color Symbol	Map Symbol	Soil Name	Rating	Dominant Component(s) and Reason(s)
	3	RIDGEBURY, LEICESTER AND WHITMAN SOILS, EXTREMELY STONY	Very limited	Component - RIDGEBURY (40%) • Depth to saturated zone Component - LEICESTER (35%) • Depth to saturated zone Component - WHITMAN (15%) • Ponding • Depth to saturated zone
	13	WALPOLE SANDY LOAM	Very limited	Component - WALPOLE (80%) • Depth to saturated zone
	18	CATDEN AND FREETOWN SOILS	Very limited	Component - FREETOWN (40%) • Depth to saturated zone • Flooding • Subsidence Component - CATDEN (40%) • Subsidence • Flooding • Depth to saturated zone
	21A	NINIGRET AND TISBURY SOILS, 0 TO 5 PERCENT SLOPES	Somewhat limited	Component - NINIGRET (60%) • Depth to saturated zone Component - TISBURY (25%) • Depth to saturated zone
	23A	SUDBURY SANDY LOAM, 0 TO 5 PERCENT SLOPES	Somewhat limited	Component - SUDBURY (80%) • Depth to saturated zone
	29B	AGAWAM FINE SANDY LOAM, 3 TO 8 PERCENT SLOPES	Somewhat limited	Component - AGAWAM (80%) • Slope
	38C	HINCKLEY GRAVELLY SANDY LOAM, 3 TO 15 PERCENT SLOPES	Very limited	Component - HINCKLEY (80%) • Slope

Gravel Source

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. Only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments.

A soil rated as good or probable source has a layer of clean sand or gravel or a layer of sand or gravel that contains less than 12 percent silty and clayey fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as poor or an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Map Color Symbol	Map Symbol	Soil Name	Rating	Dominant Component(s) and Reason(s)
	3	RIDGEBURY, LEICESTER AND WHITMAN SOILS, EXTREMELY STONY	Poor	Component - RIDGEBURY (40%) • Bottom layer • Thickest layer Component - LEICESTER (35%) • Thickest layer • Bottom layer Component - WHITMAN (15%) • Thickest layer • Bottom layer
	13	WALPOLE SANDY LOAM	Poor	Component - WALPOLE (80%) • Bottom layer • Thickest layer
	18	CATDEN AND FREETOWN SOILS	Poor	Component - FREETOWN (40%) • Content of organic matter • Bottom layer • Thickest layer Component - CATDEN (40%) • Bottom layer • Thickest layer • Content of organic matter
	21A	NINIGRET AND TISBURY SOILS, 0 TO 5 PERCENT SLOPES	Poor	Component - NINIGRET (60%) • Bottom layer • Thickest layer Component - TISBURY (25%) • Bottom layer • Thickest layer
	23A	SUDBURY SANDY LOAM, 0 TO 5 PERCENT SLOPES	Poor	Component - SUDBURY (80%) • Thickest layer • Bottom layer

Septic Tank Absorption Fields

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

The limitations are considered not limiting if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; somewhat limiting if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and very limiting if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Map Color Symbol	Map Symbol	Soil Name	Rating	Dominant Component(s) and Reason(s)
	3	RIDGEBURY, LEICESTER AND WHITMAN SOILS, EXTREMELY STONY	Very limited	Component - RIDGEBURY (40%) • Depth to saturated zone Component - LEICESTER (35%) • Depth to saturated zone • Filtering capacity Component - WHITMAN (15%) • Depth to saturated zone • Ponding
	13	WALPOLE SANDY LOAM	Very limited	Component - WALPOLE (80%) • Filtering capacity • Depth to saturated zone
	18	CATDEN AND FREETOWN SOILS	Very limited	Component - FREETOWN (40%) • Ponding • Depth to saturated zone • Subsidence Component - CATDEN (40%) • Depth to saturated zone • Subsidence • Ponding
	21A	NINIGRET AND TISBURY SOILS, 0 TO 5 PERCENT SLOPES	Very limited	Component - NINIGRET (60%) • Depth to saturated zone • Filtering capacity Component - TISBURY (25%) • Depth to saturated zone • Filtering capacity • Restricted permeability

Wetland Resources

ERT Site Walk

At the confluence of Dayville Brook and its major tributary to the west, just north of the existing movie theater parking lot, the ERT Team walked north, parallel to the largest tributary, onto the study site. Further along, where the western stream divides just below the pond, the Team stayed to the east and continued along the side of the slope above the brook. This gave the Team the needed perspective to observe the large pond and small pond further to the north.

With the small pond in sight, the Team headed east and south over the dividing ridge and intercepted the main stem of Dayville Brook. The Team followed it southwest to the confluence and proceeded back to the parking lot.

Site Description

The western tributary watercourse is confined to a narrow channel. This western tributary, up to the point where it splits below the pond, passes through and over massive bouldery, rocky areas. Individual rocks four to six feet high and across are frequent. There is a full canopy of mixed hardwood forested upland dominated by oaks (*Quercus sp.*). There is little in the shrub and herb layer apparent at this time. This upland contributes water of excellent quality to the clear flowing, well shaded stream which is three to four feet wide, often with a depth of six to eight inches in pooled areas.

There is little soil here. The depth to bedrock is minimal and often ledge or outcrops are exposed. What soil there is is till based, likely acidic from the rocks

and the accumulated organics, and it is thin. The result of this extremely shallow to bedrock situation is that many trees literally fall victim to the wind, the trees having little to anchor them to the ground.

At the point on the western tributary where the watercourse divides, the Team found a broad, flat plain which was one of the few level places on the entire area walked. Replete with mucky, high organic soils and high moisture content this level area allows the watercourse to meander freely. Here shrubby undergrowth and tussocks intermingle with decaying and mossy large, coarse woody debris.

Above the stream split and below the pond is typical palustrine wetland. A full shrub and tree layer highlights this area dense with vegetation. As mentioned above, the Team stayed in the upland to the southeast of the wet areas and from there was able to observe the surprisingly large pond. The pond, not represented on some of the maps the Team received, is estimated at about one and a half acres. It was flooded at the time and contained many trees (red maples, *Acer sp.*) and bushes emerging from standing water 12 to 15 inches deep. The smaller pond, about 1/5 of an acre, and its environs is similar to the larger.

From the small pond the Team turned east and crossed the ridge to return via the Dayville Brook Valley. There were markedly fewer boulders on this side and those that were present were smaller in size. Increased depth to bedrock here was evident by the markedly fewer wind throws - the trees having deeper soil in which to anchor their roots. The stream was similar to the western tributary being narrow and shallow. The upland, here comprised of oaks and beech on this southeast facing slope, contributes excellent water quality to the watercourse.

Recommendations

- All future municipal mapping should include/depict the watercourses and two ponds. These have been mapped on USGS topographic maps since at least 1945. In addition, once these are represented on the maps, the maps should also show the setback lines the town employs for wetlands and watercourses. In this case a 75 foot minimum for commercial use.

- It is possible that the broad flat area of the western tributary to Dayville Brook described above may have vernal areas associated with it. Though it is private property, the owners may agree to allow observation of vernal activity during the critical spring months of amphibian breeding and population dispersal to the uplands.

- Once the wetland resources are documented on the maps, the town needs to decide the importance of wetland resource preservation. Though an ERT report was provide for the shopping center and parking lot (The Schneider Property, 1981) where the Team met, it seems the town, at that time, chose to value the development over the water resource and compromise some of the values and functions of the stream.

Discussion

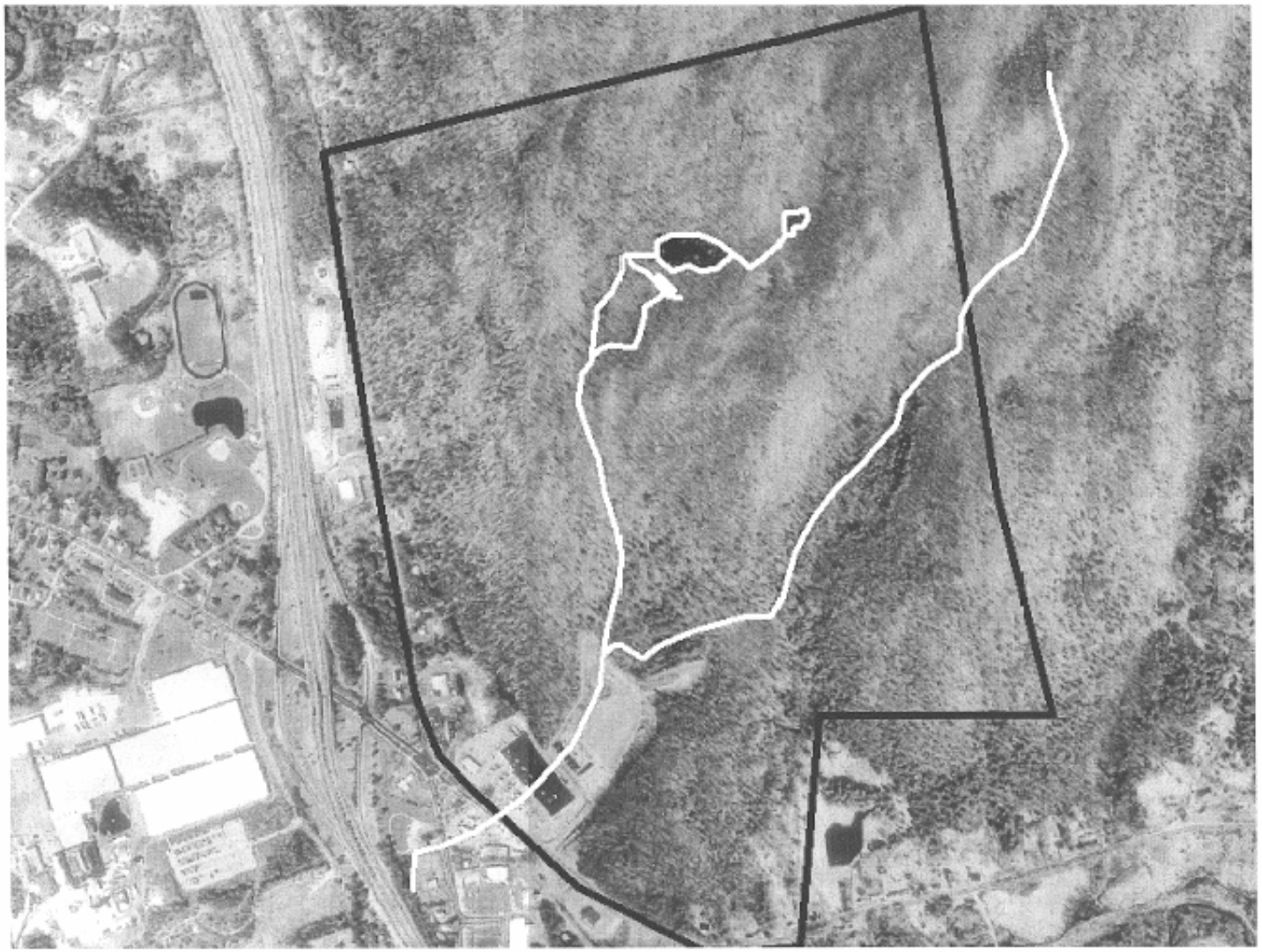
The Team followed the watercourses of Dayville Brook and its main tributary on its site walk. Some areas away from the stream paths may be different from the area the Team traversed, but for the most part bedrock outcrops on shallow soiled, bouldery, slopey land was encountered.

Construction of any type here would likely be costly because of the shallow to and exposed bedrock areas and slope issues. The slopes, while shallow along the

watercourses, sometimes reach 20-35% when going "cross country." Erosion and sediment control measures will have to be employed to minimize sediment impacts to the clean, cold water habitat of Dayville Brook and its principal tributary. These potential impacts need to be considered and this is another reason that these mapped resources should document the setback lines of the minimum 75 feet for all future planning and review.

It is important for the town to recognize that the water resources on any given parcel is typically part of a larger hydrologic system. Only the town has the ability to view and plan for their water resources as a system. Most property owners only consider what is necessary for their parcel. The cumulative impacts of many small decisions have telling effects that only long term planning at the municipal level can avoid.

It is unlikely that fisheries habitat is present here due to stream fragmentation. However, this area continues to provide the Five Mile River with clean, cold, low sediment flow. Sediments and thermal heating from removal of tree canopy could compromise the downstream fishery aspect of the Five Mile River and should be carefully considered before development.



Approximate Study Area (1990 Air Photo)

Same area of Killingly April 1934

Fisheries Resources

Dayville Brook

The headwaters of this stream originate on the site considered for a zone change. The headwaters of Dayville Brook currently do not support a fish community, however, it is likely that at one time prior to commercial development within the Schneider property and along Route 12 and 101, this section of stream may have supported a fish community. Most of the Dayville Brook channel in this area, from the cinema parking lot west to I-395 is buried within a culvert resulting in a permanent loss of stream habitat and riparian wetlands. In addition to the permanent loss of fish habitat, culverting fragments and separates fish populations by not allowing movement of fish from one section to another to complete vital aspects of fish life history, such as reproduction. Typically, headwater areas are used as adult spawning and juvenile rearing areas for fish species such as blacknose dace and native brook trout. The only viable fish habitat remaining in the Dayville Brook Watershed is at the downstream section, near its confluence with the Five Mile River. Despite all these man-made alterations, Dayville Brook on the property considered for rezoning does provide some very important ecological functions including but not limited to: flood storage, stream flow augmentation, nutrient assimilation and sediment retention. These vital functions should not be impacted by any future commercial development.

Five Mile River

The Five Mile River supports a very diverse and healthy fish community. It is annually stocked by the Inland Fisheries Division with over 4,800 adult (9-12") brook, brown and rainbow trout. It is also known to support naturally

reproducing brown trout populations often referred to as "wild brown trout." In addition to salmonids, other stream dwelling fish, which can be found in abundant numbers include: blacknose dace, longnose dace, fallfish, white sucker, tessellated darter, and common shiner. Due to the many small impoundments on the Five Mile River, obligate lake or pond species including largemouth bass, chain pickerel, yellow perch, bluegill, golden shiner, pumpkinseed, redbreast sunfish, and brown bullhead can also be found in this watercourse.

Potential Impacts

Stream Sedimentation

Site topography is hilly and rough, containing mainly steep slopes areas that are very difficult to develop. During any future development of this parcel, topsoil may become exposed and susceptible to runoff events, especially near steep slope areas. Surface topography from the parcel drains downslope into the headwaters of Dayville Brook; thus sediment runoff could negatively impact this section of stream, its wetlands and downstream areas of Dayville Brook and the Five Mile River that supports 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. Reduction s 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. Stormwaters that outlet to wetlands, ponds and watercourse 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 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 fish kills if introduced in high concentrations. Klein (1979) recommends that watershed imperviousness should not exceed 10 percent in a watershed. This amount of imperviousness has already been exceeded in the Dayville Brook Watershed.

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. Temperatures greater than 70° F can seriously threaten survival of coldwater fish such as trout.

Recommendations/Comments

Considering the prior alteration of stream resources in this area, it is recommended that the Town of Killingly ensure that any future development of this 378 acre parcel will not negatively affect onsite stream and wetland resources and viable downstream fish resources within the Five Mile River. This parcel represents 82 percent of the total watershed area of Dayville Brook, which is 462 acres in size. In light of the potential adverse affects on important aquatic and natural resources both onsite and downstream, it is recommended that the Town of Killingly carefully consider the long term and cumulative environmental impacts before rezoning this parcel from Low Density Residential and Rural Development Area to General Commercial. The following recommendations and comments are provided to minimize impacts to fisheries resources if the property is developed in the future.

Riparian Corridor Protection

It is the policy of the Connecticut Department of Environmental Protection (CTDEP) Inland Fisheries Division that riparian corridors be protected with a 100 ft. wide riparian buffer zone. It is highly recommended that a 100 foot wide riparian buffer zone be maintained along Dayville Brook. 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 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 disturbance in Connecticut have occurred when individual contractors wither 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 paced surfaces should be minimized.

Literature Cited

Bell, M.C., 1986. Fisheries handbook of engineering requirements and biological criteria. U.S. Army Corps of Engineers. Fish Passage Development and Evaluation Program. North Pacific Division, Portland, OR. 290 pp.

Cordone, A.J., and D. W. Kelley. 1961. The influences of inorganic sediment on the aquatic life of streams. California Fish and Game 47: 189-228.

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

Meehan, W.R. 1991. Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society Special Publication 19, Bethesda, MD. 751 pp.

The Natural Diversity Data Base

The Natural Diversity Data Base maps and files regarding the project 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.

Archaeological Review

The Office of State Archaeology and the State Historic Preservation Office reviewed the State of Connecticut Archaeological Site Files and Maps. They show an historic railroad bridge located in the proposed expansion area. In addition, four historic industrial archaeological sites are located in close proximity to the area. Although a rugged upland area, the distribution of wetlands and brooks throughout the proposed commercial area would suggest a moderate sensitivity for Native American archaeological resources.

The Connecticut State Historic Preservation Office and the Office of State Archaeology recommend that a reconnaissance survey be professionally undertaken in order to locate, evaluate and responsibly consider all archaeological resources that may be located within the commercial expansion zone. All archeological studies must be carried out pursuant to the *Environmental Review Primer for Connecticut's Archaeological Resources.*

Further development and new construction (zone change area) located to the north of the existing Route 101 commercial area may be compatible with existing uses and should be reviewed further on an individual basis for impacts to significant historic and architectural resources. Any proposal to demolish standing historic structures should be reviewed by the State Historic Preservation Office during the planning process.

Transportation Planning Comments

Physical Suitability of Land for Development

Geographic Information System mapping, supplied by the Town, was reviewed for the site slated for proposed zone change (from low density residential to general commercial). The topography for the site appears to have moderate to severe slopes. In addition, wetlands are located in the central and eastern areas of the site. Land conceivably more suitable for development is predominately on the northwest and southern sections. However, a strip of land in the central area, between the wetlands, may be suitable for development as long as wetland impacts can be minimized. Moreover, the topography in these sections of the site would make development very costly, considering the amount of construction costs associated with site preparation.

Traffic

The proposed site is located northeast of the intersection of State Routes 12 and 101. Route 12 is a two-lane minor arterial roadway that traverses south-north. This roadway type provides a mix of interstate and interregional travel service, but usually does not penetrate identifiable neighborhoods. Minor arterials accommodate lower traffic volumes, but provide more access to property. Route 101 in this area is a two-lane major collector roadway that traverses east-west. This type of roadway usually collects traffic from local streets within residential neighborhoods and commercial areas and channels it to the arterial system. Traffic volumes are usually low along these types of roadways.

The 2001 average daily traffic (ADT) volumes near the intersection of Routes 12 and 101 and within the vicinity of the site are shown on the following map.

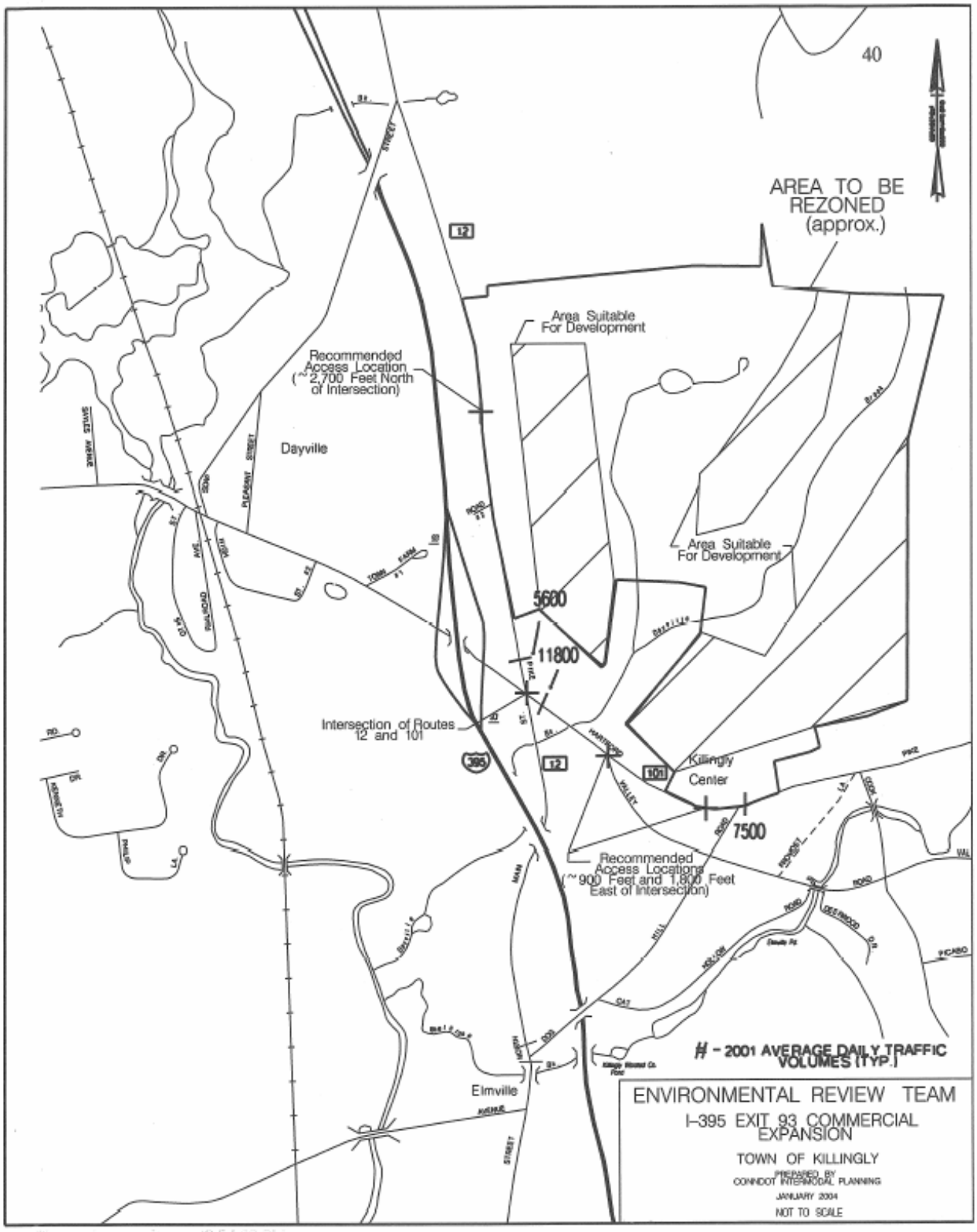
Developers seeking building permits for new developments with a minimum gross floor area of 100,000 square feet or providing 200 parking spaces having access on state highway, abutting a state highway, or substantially impacting state highway traffic must get approval from the State Traffic Commission (STC). Site-generated traffic from a "big box" development, similar to the Lisbon Landing Expansion in Lisbon, Connecticut which is approximately 570,000-sq. ft. of general commercial and retail development (Wal-Mart, Home Depot, restaurants, etc.), may potentially triple the ADT volumes in this area. The STC process would control the impacts of site generated traffic from potential new developments on these State routes in this area.

There are no State roadway projects currently programmed for this area.

Access Management

Recommended access locations are shown on the following map. These recommended access locations are sufficient distances from the intersection to allow efficient traffic operations. There is an existing driveway to the Killingly Cinemas 3 on Route 101 located approximately 900 feet east of the intersection. This driveway leads to a large parking area behind the cinema. Accessibility to the proposed site could be made available through the expansion of this driveway. However, the slopes located east of the driveway would have to be regraded to improve the sight line. Additional roadway improvements may also be warranted.

The Town should provide in its zoning regulations access management concepts to control traffic for new smaller commercial developments that may develop along Routes 12 and 101 in the future. Regulations would address the number of driveways per parcel, the spacing of driveways, the clearance of driveways away from nearby intersections, the shared use of driveways, and the need to submit driveway layouts prior to zoning approval.


AREA TO BE REZONED (approx.)
Area Suitable For Development
Recommended Access Location (~2,700 Feet North of Intersection)
Dayville
Area Suitable For Development
5600
11800
Intersection of Routes 12 and 101
Killingly Center
7500
Recommended Access Locations (~900 Feet and 1,800 Feet East of Intersection)
Elmville
- 2001 AVERAGE DAILY TRAFFIC VOLUMES (TYP.)
ENVIRONMENTAL REVIEW TEAM
I-395 EXIT 93 COMMERCIAL EXPANSION
TOWN OF KILLINGLY
PREPARED BY CONNDOT INTERMODAL PLANNING
JANUARY 2004
NOT TO SCALE

Planning Comments

- The site, while having many physical challenges (primarily slopes and wetlands), has the potential for commercial use consistent with those uses allowed under the Town's General Commercial zoning regulations.

- The use change proposed is not, in the view of the Northeast CT Council of Governments (NECCOG), inconsistent (assuming all environmental controls are adhered to) with either the current or the proposed Connecticut Plan of Conservation and Development. The location of the site (proximity to Routes 101, 12 and nearby commercial activity) makes it reasonable expansion of the current commercial activity in the Dayville/4 corners section of Killingly.

- Traffic is the NECCOG greatest concern. Route 101 east bound from the Bellpark Plaza area (west of I-395) to the intersection with Route 12 currently experiences significant congestion. Primarily this congestion occurs during weekday afternoons (3:30 p.m. to 5:30 p.m.). Looking long term (20 years) this section of roadway is projected to be over capacity. Clearly any major development of the site contemplated by this zone change will aggravate the current and projected congestion issues.

  Route 12 north from 101 has three uses of note that should be considered with regard to any potential ingress or egress to the site. The Northeast Connecticut Transit District, Killingly Town Garage, and a building supply company all utilize this section of roadway. Additionally, traffic southbound on 12 currently has poor sight lines given present uses. Use of this portion of Route 12 to access the site must be planned very carefully in terms of safety.

ABOUT THE TEAM

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

The services of the Team are available as a public service at no cost to Connecticut towns.

PURPOSE OF THE TEAM

The Environmental Review Team is available to help towns and developers in the review of sites proposed for major land use activities. To date, the ERT has been involved in reviewing a wide range of projects including subdivisions, landfills, commercial and industrial developments, sand and gravel excavations, elderly housing, recreation/open space projects, watershed studies and resource inventories.

Reviews are conducted in the interest of providing information and analysis that will assist towns and developers in environmentally sound decision-making. This is done through identifying the natural resource base of the project site and highlighting opportunities and limitations for the proposed land use.

REQUESTING A REVIEW

Environmental reviews may be requested by the chief elected official of a municipality or the chairman of town commissions such as planning and zoning, conservation, inland wetlands, parks and recreation or economic development. Requests should be directed to the chairman of your local Soil and Water Conservation District and the ERT Coordinator. A request form should be completely filled out and should include the required materials. When this request is approved by the local Soil and Water Conservation District and the Eastern Connecticut RC&D Executive Council, the Team will undertake the review on a priority basis.

For additional information and request forms regarding the Environmental Review Team please contact the ERT Coordinator: 860-345-3977, Eastern Connecticut RC&D Area, P.O. Box 70, Haddam, Connecticut 06438.