WOODBRIDGE SUBDIVISION

Tolland, Connecticut

Eastern Connecticut Environmental Review Team Report

Eastern Connecticut
Resource Conservation & Development Area, Inc.

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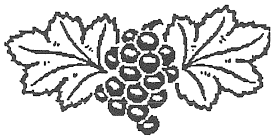
Tolland, Connecticut



Environmental Review Team Report

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

for the
Inlands Wetlands Commission
Tolland, Connecticut

October 1999

CT Environmental Review Teams
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ACKNOWLEDGMENTS

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

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

The field review took place on Wednesday, September 15, 1999.

David Askew	District Manager Tolland County Soil & Water Conservation District (860) 875-3881
Norman Gray	Geologist UCONN - Dept. of Geology & Geophysics (860) 486-1386
Ann Kilpatrick	Wildlife Biologist DEP - Eastern District (860) 295-9523
Dawn McKay	Biologist DEP - Environmental & Geographic Information Center (860) 424-3592
Brian Murphy	Fisheries Biologist DEP - Eastern District (860) 295-9523

Christopher Stone — Stormwater Engineer
DEP - Stormwater Section
(860)424-3850

I would also like to thank Steve Lowry, wetlands agent, Lois Cox, conservation commission member, and Hank Torcellini, engineer for the applicant, 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 and additional information. Some Team members made separate or follow-up field visits. 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. This report identifies the existing resource base and evaluates its significance to potential development, and also suggests considerations that should be of concern to the town. The results of this Team action are oriented toward the development of better environmental quality and the long term economics of land use.

The Eastern Connecticut RC&D Executive Council hopes you will find this report of value and assistance in reviewing this proposed subdivision.

If you require additional information please contact:
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CT ERT Program
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INTRODUCTION

Introduction

The Tolland Inland Wetlands Commission has requested assistance from the Eastern Connecticut Environmental Review Team in conducting an environmental reiview of the proposed Woodbridge Subdivision.

The 115 acre site is located between the east end of Derek Drive and Buff Cap Road north of I-84 and Route 74. There are 31 residential lots proposed that range in size from slightly over one acre to six acres. All the lots will be served by on-site sewage disposal systems and water supply wells. Approximatley 5,350 feet of new road will be constructed with two cul-de-sacs and a connection to Buff Cap road. Open space proposed consists of 33 acres along Grapeville Brook that will tie into Nye-Holman State Forest to the south.

Grapeville Brook is the major drainage feature on the site. The direct impacts to wetlands include six points where proposed roads will intersect wetlands with one crossing of Grapeville Brook. Three driveway crossings of wetlands are proposed and seven stormwater discharge points are included.

Objectives of the ERT Study

The Commission requested the Environmental Review Team to assist them with an independent review and evaluation of the applicant's plans and reports. Areas of specific concern highlighted by the IWC include: quality and function of existing wetlands, stormwater management and the effect on wetlands, development impact on the hydrogeology of the site, fisheries resource impacts, and site design as it relates to wetland impacts.

The ERT Process

Through the efforts of the conservation commission this environmental review and report was prepared for the Town of Tolland.

This report provides an information base and a series of recommendations and guidelines which cover the topics requested by the commission.

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, September 15, 1999. The emphasis of the field review was on the exchange of ideas, concerns and recommendations. Being on site allowed Team members to verify information and to identify other resources.

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

Figure 1.

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Location and Topographic Map

Scale 1" = 2000'

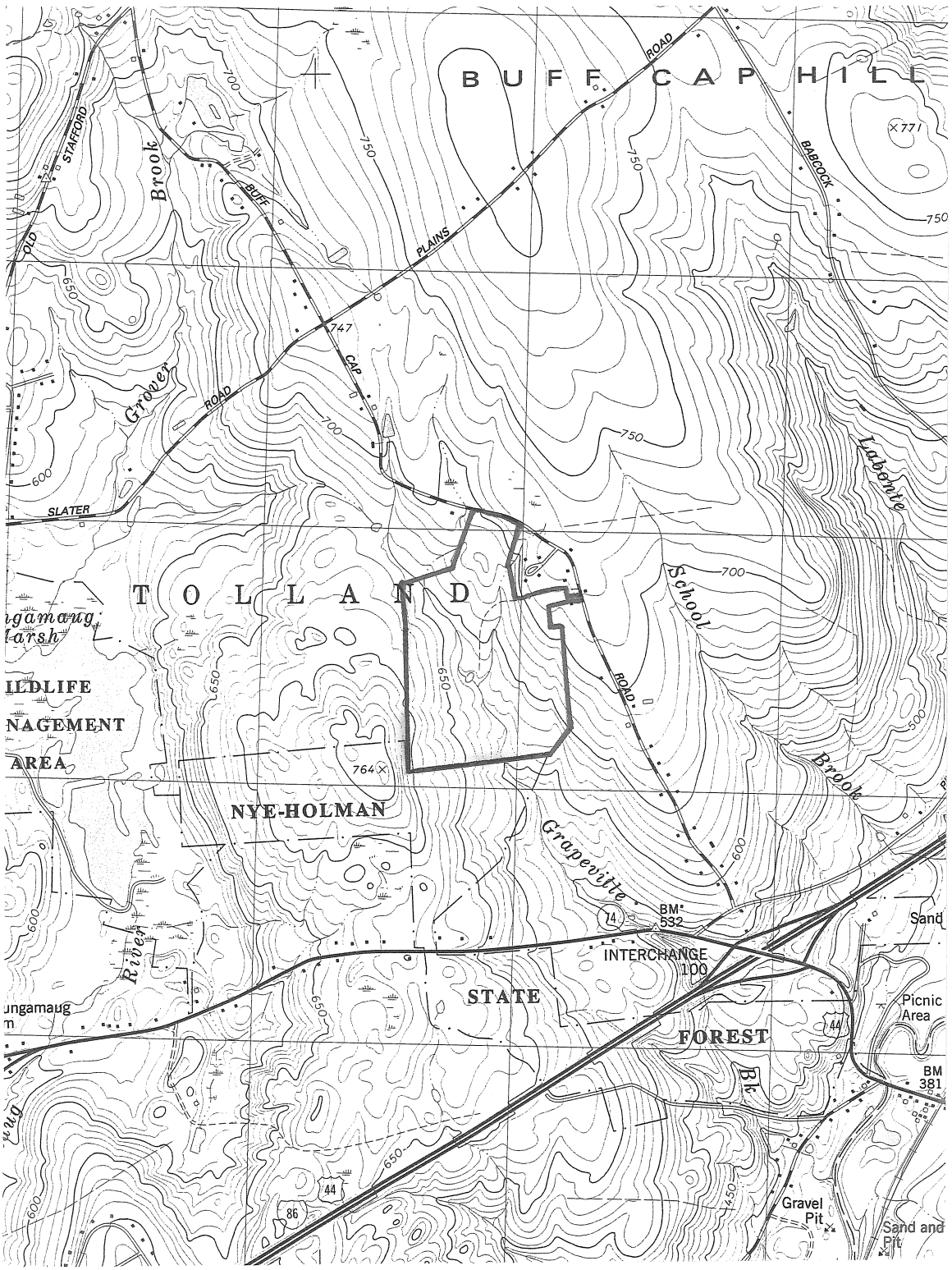

Figure 2.

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Lot Layout

Scale 1" = 1000'

TOPOGRAPHY, GEOLOGY AND HYDROGEOLOGY

The proposed subdivision straddles the valley of southeast flowing Grapeville Brook. Slopes on both sides of the valley are moderate (1:10), but uniform. Thick glacial till completely blankets the eastern slopes. The till on the western slopes is much thinner (generally less than 10 feet) and small outcrops of bedrock are present (see Figure 3). The entire site is underlain by the Brimfield Schist - a light gray to rusty-weathering quartz-feldspar-mica-garnet schist and gneiss. A major linear fault is interpreted to run along the center of the valley (see Figure 4). Although not exposed similar faults in the immediate area are wide zones of highly permeable fractured bedrock, along which springs and high yield water wells are often localized.

Environmental Considerations

- Units in Brimfield Schist are known to be sulfide rich. If the groundwater table is disturbed by the drawdown around domestic wells or because of deep excavations, the oxidation of the freshly exposed sulfides can lead to acidification and iron contamination of the local groundwater. The problem generally persists until all exposed sulfides are oxidized which in case of domestic wells may take 20 - 40 years. The likelihood of this being a serious problem can probably be assessed from the experience of established water wells in the immediate area.

- Since the site is underlain by a thin blanket of glacial till, rather than sands and gravels, the fractured fault zone along Grapeville Brook is probably more of an influence on the direction of groundwater flow than the local topography. Recharge to the proposed domestic wells will probably be from ground water northwest of the site. Groundwater flow from the site would be towards the southeast in the direction of Grapeville Brook.

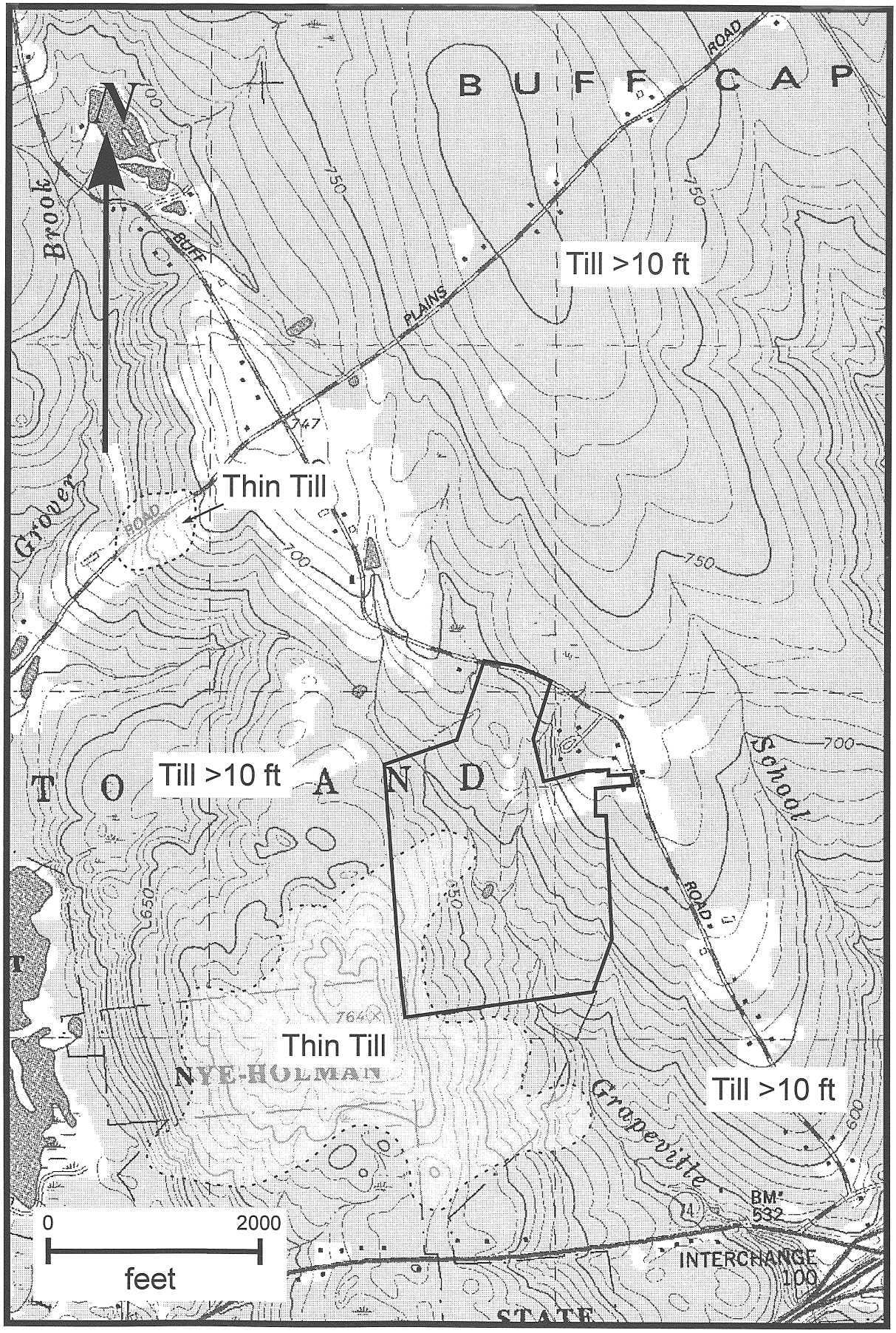
Additional information on the Surficial and Bedrock geology of the site can be found in:

Pease, M.H., Jr., Bedrock Geology of the Stafford Quadrangle, USGS Open File Report (available at the Connecticut Geological and Natural History Survey, State Office Building, Room 555, Hartford, CT)

Pease, M.H., Jr., Surficial Geology of the Stafford Springs Quadrangle, USGS GQ-1216.

Rodgers, John, 1985. Bedrock Geological Map of Connecticut 1:125,000, Connecticut Geological and Natural History Survey.

Figure 3.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Till >10 ft
Thin Till
Till >10 ft
Thin Till
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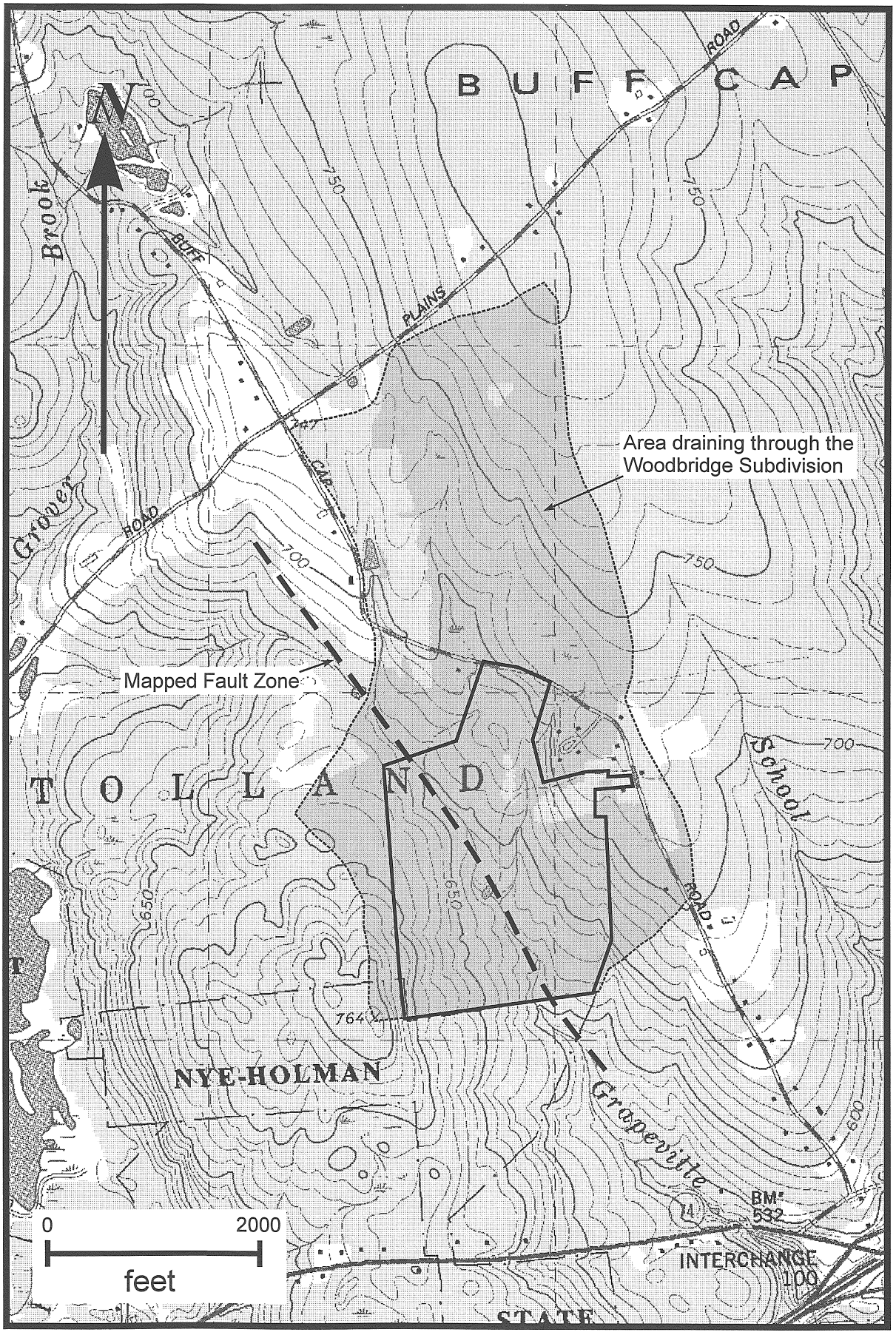
BUFF CAP
TOAND
Brook
Grover
Buff
PLAINS
ROAD
School
ROAD
Grapevine
NYE-HOLMAN
BM 532
INTERCHANGE
100
0
2000
feet

Figure 4.


N
B U F F C A P
ROAD
Brook
BUFF
PLAINS
CAP
Grover
ROAD
Area draining through the Woodbridge Subdivision
Mapped Fault Zone
T O L L A N D
School
ROAD
NYE-HOLMAN
Grapevine
BM 532
INTERCHANGE
100
STATE
700
750
650
600
764
0
2000
feet

WETLAND RESOURCE REVIEW

The issues and concerns that relate to wetland resources are:

1) The wetland's ability to accept increased runoff -

The Team wetland specialist has not seen any hydrological investigations that indicate that there would be an increase in storm water runoff volumes or peak flow rates off of this parcel as a result of the proposed development. Stormwater runoff increases in relation to the amount of impervious surfaces created on natural soils. Increases can be attenuated by infiltrating collected stormwater into the soils to mimic, as closely as possible, the natural infiltration existing prior to development. The stormwater to be collected from the proposed roadway will be discharged at seven separate locations, six of which are via level spreaders and one being a detention basin/level spreader system. Most of these level spreaders appear to be located well away from wetland soils and will outlet onto "somewhat excessively" drained soil map units (as classified by the USDA-Natural Resource Conservation Service) which implies that these soils have a relatively high infiltration rate. This means that a majority of the stormwater collected from the roads may very likely infiltrate into the soil prior to its entry into wetlands and watercourses via groundwater.

This favorable condition depends heavily on the design integrity of the level spreader units. The design parameters for a level spreader should ensure that water velocities leaving the lip of the level spreader will not create erosive conditions "downstream" of the spreader. A suggested velocity of two (2) feet per second is offered. Also, the "lip" should be consistently level, without dips or sags that would create an opportunity for outletting stormwater to reconcentrate downstream of the spreader. It would be ideal to use poured concrete (with footings) to form the spreader lip, or perhaps some sort of plastic or pressure treated wood to form a rigid, level surface.

The other impervious surfaces proposed are the rooftops and driveways. The low density of settlement, one (1) to six (6) acres lot sizes, should make the effect of these impervious surfaces minimal. Utilization of gravel drives and roof water infiltrators would make it negligible.

2) The quality and function of existing wetlands -

The report entitled "Wetland Report / Woodbridge Subdivision / Derek Drive & Buff Capp Road / Tolland, Connecticut", dated 8/99, by John P. Ianni of Highland Soils, included a discussion of wetland resources, wetland impacts, as well as an alternative analysis of those impacts. In general the topic was adequately treated. One topic that may need more information however, is the conclusion reached concerning the value of the westerly man-made pond. It was stated that this depressional, ephemeral wetland was inspected during the spring and determined not to be a vernal pool.

Vernal pools are small, shallow, circular depressions in the landscape which fill with water during the wetter periods of the year (spring and late fall), and become drier during the warmer summer months. True vernal pools also support unusually diverse and dynamic assemblages of wildlife. Much of this wildlife is solely dependent on these areas for one or more periods of their life cycle. Because of the absence of permanent water, fish do not live in these ephemeral pools, making these areas very attractive to certain animals which would normally fall prey to these carnivorous fish. The amphibian life that use these pools as breeding grounds soon migrate into the surrounding uplands to live out their adult phase and return to the pools only to breed.

It is recommended that more information be obtained from Mr. Ianni on how he came to his conclusion. On precisely what dates did he observe this wetland? What indicators was he looking for? What sampling methods did he use?

3) Is there a better site design with less impact?, and, 4) Is it necessary to impact wetlands to give the development a through road?

If a through-road is a basic assumption for this project, the general design layout currently proposed seems to be the best alternative. The following recommendations are offered in order to mitigate subsequent wetland and watercourse impacts:

a. Incorporate headwalls and/or retaining walls in the design of the proposed arch culvert. This may reduce the amount of fill necessary on either side of the road within wetlands.

b. Provide for under-drainage at the three driveway wetland crossings.

c. Combine driveways for lots 51 and 52.

d. Create conservation restrictions to be placed on the deeds for those lots with wetlands present on them. These restrictions would include a statement of wetland function and value as well as the particular restrictions to be placed on the wetlands and/or wetland buffer areas.

e. Permanently demarcate wetland and/or wetland setback areas with durable, visible markers to remind future landowners as to their presence.

f. Add temporary sediment basins and diversion swales to the erosion and sedimentation plan at strategic locations in order to further mitigate potential wetland/watercourse sedimentation. Possible locations may include: down-slope of the proposed Derek Drive cul-de-sac, in the vicinity of Woodbridge Drive road station 15+00 and 20+00, and at the junction of Grapeville and Woodbridge Drive.

g. Plan for the potential diversion of water around the wetland crossing at Woodbridge 17+00 during the construction period. Create a separate construction sequence for this operation only.

h. Refer to the Stormwater portion of this ERT report for suggestions to improve stormwater quality.

i. Maintenance requirements of permanent stormwater management features (detention basin, catch basin sumps, sediment control chambers, level spreaders, etc.) should be included on the plan, including who specifically will be responsible for that maintenance.

The proposed impoundment at the detention basin should be reviewed by the Dam Safety Unit of this division. Contact Wes Marsh at 860-424-3706 to pursue this matter.

As this project will involve 0.56 acres of wetland impacts, a Level II permit review is required by the U.S. Army Corp of Engineers (A.C.O.E.) in conjunction with this division of the CT DEP. For questions regarding these regulatory programs contact the A.C.O.E. at 617-647-8338 / 800-343-4789 or Sally Snyder of the CT DEP at 860-424-3019.

STORMWATER MANAGEMENT

The project is a proposed 115 acre single-lot subdivision between Derek Drive and Buff Cap Road with 31 residential lots. The lots will be served by on-site wells and septic systems. Grapeville Brook and associated wetlands run north to south through the center of the site. The majority of these wetlands, approximately 30% of the site, will be maintained as open space. The site topography ranges from grades of 2% to 20% with an average of 5 -10%. The site is bordered to the south by the Nye-Holman State Forest and on all other sides by residential lots.

Thirty of the proposed 31 lots front on the two new roads serving the subdivision. One lot fronts on Buff Cap Road. The main road through the site, with a length of approximately 4000 feet, will be Woodbridge Drive. Grapeville Brook Way will extend approximately 900 feet off this road to serve the north part of the subdivision. Two lots on the west side of the site will front on a short extension of Derek Drive. The proposed drainage system consists of a series of catch basins eventually discharging to one of seven outfalls Approximately half of Woodbridge Road will discharge to a detention basin. This basin and the other outlets will discharge to be wetlands and watercourse within the site through energy dissipaters and level spreaders. A major 18-foot wide arch culvert is proposed to allow Grapevillc Brook to pass under Woodbridge Drive. There are also two (2) other smaller pipe culverts that will allow wetlands or intermittent watercourses to pass under roadways. For the larger drainage systems, a "sediment control chamber" is proposed prior to discharge.

The design plans indicate that during construction silt fence will be used along the perimeter of disturbed areas. In addition, the construction should be phased, where possible, to minimize the area of soil exposure at any given time. Gravel dam reinforcement of the silt fence should be considered in areas where length, steepness or area of slope present the possibility of high flows. To prevent, as much as possible, the transport of sediment on the site, gravel and silt fence check dams should also be provided along the roadway shoulders and any diversion swales. The General Permit for the Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities requires that sedimentation storage be provided for drainage areas greater than 2 acres. No sedimentation basins or swales are indicated on the plans.

These must be shown where conditions apply. In addition, the proposed sediment control chambers should be designed utilizing swirl concentrator technology or equal. A simple baffled chamber is not adequate. Also, a sedimentation control chamber should be included prior to the drainage outfall on the south side of Lot 69. A maintenance schedule must be included for all erosion and sedimentation control measures and structures both during construction and for long-term maintenance.

There are several areas along the proposed roads where there are limited but steep cut or fill slopes. Measures to control possible groundwater seeps and erosion of cut slopes should be addressed. Special slope stabilization measures may be necessary for both cut and fill slopes. These should all be indicated on the plans. The use of erosion control blankets may be appropriate on these slopes, especially when adjacent to wetlands. The construction, stabilization and maintenance of the proposed detention basin should also be addressed.

One way to reduce the impact of stormwater discharges is to reduce the discharges themselves. The town and the applicant may want to investigate means of reducing runoff from the site. This could involve the elimination of curbing for portions of the roadway system, allowing sheet flow to disperse and infiltrate rather than discharge to the drainage system. Other means of reducing runoff such as segregating and infiltrating roof runoff should also be investigated.

A registration for the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities must be submitted at least 30 days prior to the start of construction. A Stormwater Pollution Control Plan must also be prepared and submitted at the same time. In general, erosion and sediment control measures utilized must be appropriate for a site of varying grades adjacent to a sensitive wetland and watercourse. Sedimentation basins or swales shall have a capacity of at least 134 cubic yards per acre drained. The detention basin may be modified to function as a sedimentation basin during construction. Disturbed areas to be left bare for over 30 days will receive temporary seeding or heavy mulch. All disturbed areas must be seeded as soon as possible. No areas may be left bare by the end of the planting season. Care must be taken to properly stabilize seeded areas with mulch and/or geotextiles. Properly constructed and

maintained, the site should have minimal impact on the adjacent wetlands and watercourses.

SOIL AND WATER CONSERVATION DISTRICT REVIEW

(Note: Except for the discussion of soils and erosion control the District Team member has limited his review to those issues outlined in the documents from the Tolland Inland Wetlands Commission. Most of the issues deal with impacts to wetlands and water quality, which are appropriate to consider as part of a review of an inland wetland application.

Based on informal discussions with members of the Conservation Commission there are some issues regarding open space. This issue is more appropriately handled by that Commission and the Planning and Zoning Commission, and is not specifically a part of the ERT review requested by the town. As it is understood, the Conservation Commission wishes to link open space on this parcel with adjacent parcels and would like to see a broader wildlife corridor along Buff Cap Road. The District Team member will comment that that the applicant seems willing to accommodate the town as much as possible in terms of the specific location of open space corridors. This impression is based on an informal discussion with the applicant's agent.)

Soils

Uplands consist of the following:

- Sutton very stony fine sandy loam
- Charlton fine sandy loam
- Gloucester and Charlton very stony soils

Individual soil descriptions may be found in the Appendix.

These soils all have erosion hazards in the low to medium range. Erosion control throughout the parcel should be manageable with standard erosion control practices. The steepest slopes are generally associated with the Gloucester soils, which are permeable and excessively drained. As with any site, erosion is a possibility on any of these soils if proper controls are not installed. Nearly every lot is close to a wetland, so any erosion problems have the potential to cause immediate detrimental impacts to sensitive resources. An aggressive inspection and

maintenance schedule should be instituted during the entire construction process.

Wetlands

- The Wetland Report by Highland Soils LLC accurately describes the wetlands and provides a credible description of wetland values. The wetland fingers that extend into the uplands are a relatively common feature in Tolland, and typically have low to moderate values for most wetland functions (although this Team member believes that the value for nutrient removal, retention, and transformation is understated). Before alterations are approved for impacts associated with these wetlands, the Inland Wetlands Commission must determine that there are no feasible or prudent alternatives to the impacts.

- Impacts to isolated and finger wetlands appear reasonable in terms of minimizing impacts to the extent possible in the context of the entire subdivision. Hydrological functions will be maintained by providing cross culverts under the road and driveway crossings. To prevent secondary impacts associated with individual lot development, the Inland Wetlands Commission may consider requiring permanent field delineation of the wetlands. This is an increasingly popular technique being used in a number of towns in an effort to discourage some of the common impacts often associated with residential development, such as clearing, expansion of lawn areas, and dumping of yard waste. Permanent delineation may consist of a low post with a simple sign identifying the wetland as a "regulated area". Depending on the amount of vegetation the posts can be spaced 50 to 100 feet apart.

- The crossing of Grapeville Brook is the most significant alteration. Based on discussions with representatives from the town, the crossing is necessary to provide a through road from the existing subdivision to Buff Cap Road. A through road is considered necessary in terms of providing reasonable access and egress through the subdivision. If this were not the case, a double cul-de-sac could be constructed on wither side of Grapeville Brook, with no loss of lots.

- Efforts have been made to reduce the impact of the crossing by installing a single arch culvert. This will reduce both short and long-term impacts associated with the culvert and will minimize impact to existing fish habitat.

- It is a common construction practice to extend the clearing associated with stream crossings a far distance beyond that which is necessary for construction. Since this is a cold water stream, thermal impacts are a concern. Therefore, clearing limits should be clearly delineated prior to any clearing and those limits should be the minimum required to construct the crossing. In addition, efforts should be made to minimize impacts from the clearing operation by preventing logging equipment from crossing the stream directly.

Erosion Control

- An erosion control plan has been developed for the subdivision. The plan shows the location of proposed silt fence associated with the road and stormwater system - the locations are appropriate as shown. Additional controls may be necessary during road constructions, especially on road cuts on hills. In-road diversions, stone-lined swales, and check dams, and stone outlets should be used as necessary.

- Individual erosion control plans will be developed for each lot during the application process for lot development.

Stormwater Management

- The stormwater management plan is well designed to break up flows into manageable components. A total of seven discharges are proposed. These have been located to minimize pollutant discharges associated with stormwater. Most of the discharge locations are well away from sensitive surface waters and flows have generally long travel distances through both uplands and wetlands.

- Discharge #4, as described in the Wetland Report, is located closest to Grapeville Brook. A sediment chamber is proposed to remove solids. This should provide adequate surface water protection, provided that the sediment chamber is cleaned out annually.

- The detention basin is a wet bottom system with deflector berms to increase the travel time from inlet to outlet. These types of basins increase the potential for pollutant removal compared to standard detention basins. The design is consistent with accepted Best Management Practices (BMP's).

- Most of the discharges include level spreaders at the outlet. Level spreaders have proven to be somewhat problematic unless they are constructed properly and maintain the elevations specified by the designer. As built, many spreaders do not adequately disperse flows and they are prone to "blow outs". For this reason, the town may want to require that an engineer supervise the construction of the level spreader.

- New technologies and methods for stormwater management are currently being developed at a fast pace and their use is becoming more common in subdivision designs around the state. While the proposed stormwater management plan is not "state of the art", it does include some advanced techniques such as the wet bottom detention basin. It also breaks up flows into manageable components and uses the existing land base to disperse flows before they reach surface waters.

- The impact of pollutants resulting from lawn maintenance is listed as a concern in the ERT documents submitted by the town. In the Appendix is a brochure the District developed for the Scantic River Watershed, which addresses some of those concerns. It should be noted that Inland Wetland Commissions have no direct jurisdiction over such issues, and should be cautious in applying standards to new developments that are not applied to existing residential development.

Summary

- Generally, this is a well laid out subdivision that is reasonably sensitive to existing resources. Grapeville Brook and its associated wetland are the most valuable resources on the parcel and these are protected within the large central open space corridor. While it appears that the subdivision could be developed without the

Grapeville Brook crossing, this conflicts with town planning goal of providing reasonable access from subdivisions to larger thoroughfares.

- Since most lots have wetlands on them, protection from secondary impacts could be improved by permanently delineating the wetland boundary.

- Water quality within surface waters is reasonably protected with the proposed stormwater management plan. It is believed that the town has an adequate catch basin and street sweeping program to protect water quality in the future.

Figure 5.

Soils Map

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Scale 1" = 1320'

THE NATURAL DIVERSITY DATA BASE

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

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

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

FISH RESOURCES

Fish Community

Grapeville Brook is a small headwater stream that supports a viable coldwater fish community comprised of native brook trout and blacknose dace. This is the type of watercourse that the general public would overlook as too small to support fish; however, fisheries biologists and stream ecologists recognize this habitat as very sensitive and critical to the production and survival of fish populations.

Most brook trout in this stream are less than 20 cm in length. Brook trout typically spawn in Connecticut during the month of October in tailwater areas of pool habitats. Eggs incubate within gravel over the fall and winter periods with eggs hatching in late February or early March. Fry remain in the gravel until their yolk sacs are absorbed at which time the fry emerge from underneath the gravel and move into preferred stream microhabitats.

Blacknose dace are small fish in the minnow family that range from 5 to 8 cm in length at maturity. Spawning occurs in the spring usually May through June in shallow riffle habitats.

The stream is of moderate gradient adjacent to the proposed subdivision. Albeit variable most mesohabitat is in the form of riffle/pool habitat that contains medium size gravels and cobbles. The stream contains minimal amounts of fine silts and coarse sands. Primary adult brook trout habitat is in the form of undercut banks and deeper pools. The stream is well shaded with a very tight, closed overhead canopy.

Impacts

Subdivision design has mitigated for most potential impacts to fisheries resources of Grapeville Brook by: (1) installing an arch culvert at the major stream crossing at Beaujolais Way which will provide unrestricted fish passage, (2) providing a sufficient (greater than 100' in width) undisturbed vegetated riparian buffer zone adjacent to Grapeville Brook and (3) designing a stormwater management system

which should minimize the long term and excessive influx of fine sediments to the watercourse.

As with any subdivision development there is always a potential for erosion and stream sedimentation due to disturbed soils. If sediment runoff does occur the following damage to stream ecosystems could be expected:

(1) Sediment reduces the survival of resident fish eggs and hinders the emergence of newly hatched fry. Adequate water flow, free of excess sediment particles is required for fish egg respiration and successful hatching.
(2) Sediment reduces the survival of aquatic macroinvertebrates. Since aquatic insects are important flood items in fish diets reduced insect populations levels in turn will adversely affect fish growth and survival Fish require an excessive output of energy to locate preferred prey when aquatic insect levels decrease.
(3) Sediment reduces the amount of usable habitat required for spawning purposes. Excessive fines can clog and even cement gravels and other desirable substrate together. Resident fish may be forced to other areas not impacted by siltation.
(4) Sediment reduces stream pool depth. Pools are invaluable stream components since they provide necessary cover, shelter, and resting areas for resident fish. A reduction of usable fish habitat can effectively limit fish population levels.
(5) Turbid waters impair gill functions of fish and normal feeding activities of fish. High concentrations of sediment can cause mortality in adult fish by clogging the opercular cavity and gill filaments.
(6) Sediment encourages the growth of filamentous algae and nuisance proportions of aquatic macrophytes. Eroded soils contain plant nutrients such as phosphorous and nitrogen. Once introduced into aquatic habitats, these nutrients function as fertilizers resulting in accelerated plant growth.
(7) Sediment contributes to the depletion of dissolved oxygen. Organic matter associated with soil particles is readily decomposed by microorganisms thereby effectively reducing oxygen levels.

Recommendations

1. Albeit breached, the dam at the Grapeville Brook Impoundment does provide a barrier to upstream fish passage especially during base flow periods. Thus, it is recommended that the breached portion of the dam be lowered 1 to 2 feet to allow for upstream fish passage. This can be easily accomplished by the removal of small rocks and boulders at the breach which will not only lower the elevation but provide for a more gradual streambed transition into the pond. This mitigation measure will ensure that the pond does not fragment the existing fish community.

2. Develop an aggressive and effective 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 sediment basins. Land disturbance and clearing should be kept to a minimum and all disturbed areas should be restabilized as soon as possible. Exposed, unvegetated areas should be protected from storm events. The applicant and 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 future soil erosion violations. Past stream siltation disturbances in Connecticut have occurred when individual contractors either improperly deployed mitigation devices or failed to maintain these devices on a regular basis.

3. All instream work and land grading/filling within Grapeville Brook should take place during low flow periods. Care should be exercised so as not to increase turbidity levels. As a best management practice, any unconfined instream work within Grapeville Brook should be restricted to the time period from June 1 to September 30, inclusive. A June 1 through September 30 time frame can be utilized as an effective mitigation measure for construction related disturbances due to the following reasons: (1) time frame will serve to protect spawning, egg incubation, and fry development of resident fishes, (2) time frame does not interfere with seasonal migratory behaviors, and (3) time frame coincides with historic low rainfall levels in Connecticut a period in

which instream construction activities such as dewatering, trenching, and cofferdam placement are most effective.

WILDLIFE RESOURCES

Wildlife Community

Uplands - The project site is dominated by mature mixed-hardwood forest comprised of oak, hickory and maple with a well-developed understory of saplings, shrubs and herbaceous ground vegetation. A small component of softwoods is present, including scattered clumps of pine and hemlock and a small dense stand of hemlock in the southern portion of the property. Given the structure and size of the forest and its proximity to several large tracts of protected open space (e.g., Charter Marsh Wildlife Management Area to the west, Nye Holman State Forest to the south and Kollar Wildlife Management Area to the east), wildlife species described as "area sensitive" can be expected to use the property. Included on this list would be a number of forest birds that require relatively large tracts of continuous forest for successful breeding (e.g., veery, yellow-throated vireo, scarlet tanager, sharp-shinned hawk and barred owl), and animals that have large home ranges (e.g., fisher, bobcat, black bear and wild turkey).

Wetlands - The most significant habitat feature on the property is Grapeville Brook and its associated riparian zone (zone of vegetation immediately adjacent to the bank of a stream or other water body). A diversity of wildlife are attracted to wetlands due to the complex vegetative structure and abundance of food present in the form of insects, berries and seeds. Grapeville Brook likely provides food and den sites for aquatic mammals such as mink and river otter and breeding habitat for amphibians such as northern two-lined and dusky salamanders. Forested riparian zones aid in the survival of aquatic invertebrates and plants by removing excess nutrients and sediment; provide shade for optimum light and temperature conditions necessary for the survival of fish; and provide a source of leaf matter and woody debris which provide both food and shelter for aquatic insects, fish and amphibians. In addition, forested riparian areas serve as travel corridors for wildlife.

Potential Impacts

As forests become replaced or fragmented by roads and development, wildlife habitat is lost and the potential for wetland and water quality degradation increases. It has been documented that isolated patches of forest smaller than 100 acres are characterized by a low density and diversity of birds that breed within the forest interior. High rates of nest parasitism by cowbirds and nest predation by small mammals such as raccoons, skunks and domestic cats have been reported where small patches of forest are surrounded by open habitat. Similarly, mammalian predators that have large home ranges, such as bobcat and fisher, tend to avoid areas where large permanent openings exist.

One group of species that are especially sensitive to wetland alterations, water quality degradation and habitat fragmentation are the amphibians because they have small home ranges, relatively limited dispersal capabilities and high site fidelity. The uplands surrounding vernal pools and other temporary wetlands are an integral part of the wetland systems that amphibians require for survival. For example, studies have shown that salamanders may move up to a half mile or more from their breeding pools into adjoining uplands to access feeding and wintering habitat. Road systems can serve as barriers to this movement and can significantly impact amphibian populations through direct mortality (i.e., road kills) where roads intersect major migration and dispersal routes. Other barriers, such as curbing, berms and drainage ditches, can trap amphibians or cause them to divert from their normal migration routes. Reptiles and small mammals can be similarly affected by these barriers.

Recommendations

In general, the proposed subdivision design (i.e., road location, alternative wetland crossing design and suggested changes to the storm water management system) and open space will serve to protect the integrity of Grapeville Brook and maintain an effective travel corridor for wildlife. While there are no hard and fast rules for determining the optimum width of travel corridors for wildlife, a good minimum width to aim for is 300 feet. The open space has been set-aside in the most

logical location on the property in that it encompasses Grapeville Brook and provides a direct connection with Nye Holman State Forest.

To retain the value of the property as breeding and feeding habitat for amphibians and area sensitive wildlife, the following recommendations should be considered:

- (1) Expand the effective width of conserved land (i.e., maximize the buffer between the development and the open space) by establishing a conservation easement/s which encumbers the lots directly adjoining the open space. The conservation easement should restrict further development, the creation of manicured lawns, and the use of chemical applications to reduce the amount of "lost habitat", promote the retention of primarily wooded habitat and reduce the potential for wetland contamination. The easement should allow accepted conservation practices, such as timber stand improvement and wildlife habitat enhancement, to be conducted. The restrictions should be clearly defined and incorporated into the deed of record and the boundaries marked in the field. Highest priority for expansion of the protected open space should be where it joins Nye Holman State Forest, either through a conservation easement or by eliminating Lot 50 from the subdivision.

- 2) Minimize the amount of land clearing during house construction and encourage landowners to use natural landscaping techniques. Mature, healthy-crowned oaks, hickories, and maples, conifer cover, stonewalls, and den and cavity trees should be retained during land clearing where possible for their value in providing food, nest sites, shelter, and perch sites. Consider implementing a community outreach program to inform landowners about the effects of habitat fragmentation, ways to protect water quality, and the importance of forest stewardship. Written materials on these topics have been developed through the University of Connecticut Cooperative Extension System's *Nonpoint Education For Municipal Official's* (NEMO) Project and Forest Stewardship Program and may be obtained by contacting the Haddam Extension Office at 860-345-4511. Information on various methods for enhancing wildlife habitat may be obtained by contacting the Connecticut DEP Wildlife Division at 860-295-9523.

- 3) Optimally, to protect amphibian populations in a given area an investigation would be required to identify breeding sites and migration and dispersal routes so that roads and development could be directed away from those areas that are most critical. In the absence of this information, however, effects on amphibians can be reduced by a) avoiding direct impacts to wetlands and watercourses, b) maintaining water quality through a reduction of impervious surfaces and implementation of an aggressive sediment and erosion control plan, and c) reducing barriers to migration including staggering haybales and silt fences in shorter lengths and eliminating the use of curbing where possible; where necessary, Cape Cod style curbs (i.e., curbs at 45 degree angle) are recommended. The suggested open bottom arched culvert also would be preferred over the standard culvert design for maintaining natural habitat conditions for macroinvertebrates and facilitating amphibian movements. Also, an effort should be made to protect the small pond on Lot 66 that may serve as breeding habitat for several species of reptiles and amphibians such as spotted turtles, green frogs, spotted salamanders and potentially marbled salamanders.

APPENDIX

CaB CHARLTON FINE SANDY LOAM, 3 TO 8 PERCENT SLOPES This unit consists of gently sloping, well drained soils. The Canton soils formed in sandy deposits over friable sandy gravelly till and the Charlton soils formed in friable loamy till. It is on the crests and side slopes of upland hills and ridges. Bedrock is commonly more than 60 inches below the surface. The water table is commonly below a depth of six feet in these soils. The permeability of the Canton soils is moderately rapid in the surface layer and subsoil, and rapid in the substratum. The permeability of the Charlton soils is moderate or moderately rapid throughout. Surface runoff is medium and the available water capacity is moderate.

ChC CHARLTON STONY FINE SANDY LOAM, 8 TO 15 PERCENT SLOPES This unit consists of sloping, well drained soils. The Canton soil formed in sandy deposits over friable sandy gravelly till and the Charlton soil formed in friable loamy till. It is on the side slopes of upland hills and ridges. Stones and boulders cover 2 to 10 percent of the surface. Bedrock is commonly more than 60 inches below the surface. The water table is commonly below a depth of six feet. The permeability of the Canton soils is moderately rapid in the surface layer and subsoil, and rapid in the substratum. The permeability of the Charlton soils is moderate or moderately rapid throughout. Surface runoff is rapid and the available water capacity is moderate.

ChD CHARLTON STONY FINE SANDY LOAM, 15 TO 25 PERCENT SLOPES This map unit consists of deep and very deep moderately steep to steep, well drained soils on ridges, hills, and side slopes of glacial till uplands. The areas are mostly long and narrow in shape. Slopes are mostly smooth and convex and are mainly less than 200 feet long. Stones cover 8 to 25 percent of the surface. About 45 percent of the total acreage of this map unit is Canton soils, 40 percent is Charlton soils, and 15 percent is other soils. The water table in these Canton and Charlton soils is commonly at a depth of more than 6 feet. The permeability of the Canton soils is moderately rapid in the surface layer and subsoil and rapid in the substratum. The permeability of the Charlton soils is moderate or moderately rapid. Both soils have moderate available water capacity and rapid runoff.

CrC CHARLTON VERY STONY FINE SANDY LOAM, 3 TO 15 PERCENT SLOPES This map unit consists of gently sloping to sloping, well drained soils. The Canton soil formed in sandy deposits over friable sandy gravelly till and the Charlton soil formed in friable loamy till. It is on the side slopes of upland hills and ridges. Stones cover 10 to 35 percent of the surface. Bedrock is commonly more than 60 inches below the surface. The water table is commonly below a depth of six feet. The permeability of the Canton soils is moderately rapid in the surface layer and subsoil, and rapid in the substratum. The permeability of the Charlton soils is moderate or moderately rapid throughout. Surface runoff is medium to rapid, and the available water capacity is moderate.

GeE GLOUCESTER AND CHARLTON VERY STONY SOILS, 15 TO 35 PERCENT SLOPES This map unit consists of deep and very deep moderately steep to steep, well drained soils on ridges, hills, and side slopes of glacial till uplands. The areas are mostly long and narrow in shape. Slopes are mostly smooth and convex and are mainly less than 200 feet long. Stones cover 8 to 25 percent of the surface. About 45 percent of the total acreage of this map unit is Canton soils, 40 percent is Charlton soils, and 15 percent is other soils. The water table in these Canton and Charlton soils is commonly at a depth of more than 6 feet. The permeability of the Canton soils is moderately rapid in the surface layer and subsoil and rapid in the substratum. The permeability of the Charlton soils is moderate or moderately rapid. Both soils have moderate available water capacity and rapid runoff.

SwB

51B

SwB - Sutton fine sandy loam, 2 to 8 percent slopes, very stony

This nearly level to gently sloping moderately well drained soil is on upland glacial till plains, hills, and ridges. Stones and boulders cover 1 to 8 percent of the surface. Areas are dominantly irregular in shape.

Typically, this Sutton soil has a very dark grayish brown, fine sandy loam surface layer 4 inches thick. The subsoil is yellowish brown, dark yellowish brown, and dark brown, mottled fine sandy loam and sandy loam 29 inches thick. The substratum is olive brown, mottled sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of well drained Canton and Charlton soils; moderately well drained Woodbridge soils; and poorly drained Leicester soils. Included areas make up about 10 percent of this map unit.

The Sutton soil has a seasonal high water table at a depth of about 18 inches. Permeability is moderate or moderately rapid. The available water capacity is moderate. Runoff is slow or medium. Sutton soil warms up and dries out slowly in the spring.

The major limiting factor for community development is the seasonal high water table. Onsite septic systems need special design and installation to prevent effluent from seeping to the surface. Foundation drains help to prevent wet basements. Lawns are wet and soggy in the fall and spring. Quickly establishing a plant cover and using mulch, temporary diversions, and sediment basins to help control erosion during construction.

GLOUCESTER SERIES

The Gloucester series consists of somewhat excessively drained Brown Podzolic soils that developed on very friable to slightly firm, coarse-textured Late Wisconsin glacial till. The till was derived principally from granite rocks that have imparted to the soils a relatively high content of sand of various sizes.

The Gloucester soils are commonly associated with the well-drained Charlton and Brookfield soils, which developed on glacial till, and with the Hinckley and Merrimac soils, which developed on stratified sand and gravel. The Gloucester soils are coarser textured than the Charlton and Brookfield soils. The Gloucester series is centered on soils that have a light sandy loam to loamy sand B horizon. The Gloucester soils also differ from Brookfield in color. The Brookfield soils are yellowish red in parts of the solum. The wet soils associated with the Gloucester are the Leicester and Whitman.

A profile of Gloucester stony sandy loam in a fresh road cut 1.1 miles northeast of the junction of Merrow and Anthony roads in the town of Tolland:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) sandy loam, but close to loamy sand; very weak, coarse, granular structure; very friable; about 15 percent coarse skeleton; abrupt, smooth boundary.

B21—6 to 12 inches, dark yellowish-brown (10YR 4/4) light sandy loam; breaks into very soft subangular clods that are very friable; 15 to 20 percent coarse skeleton; clear, wavy boundary.

B22—12 to 19 inches, yellowish-brown (10YR 5/6) loamy sand or loamy fine sand; massive; very friable; 15 to 20 percent coarse skeleton; clear, wavy boundary.

B23—19 to 23 inches, yellowish-brown (10YR 5/4) loamy sand; very friable to loose; about 20 percent coarse skeleton; clear, wavy boundary.

C1—23 to 43 inches, light-gray (10YR 7/1) and olive-gray (5Y 5/2) gravelly loamy coarse sand or coarse sand with a few streaks of olive brown (2.5Y 4/4) in root channels; slightly firm in place when dry, but very friable to loose when moist; some stone fragments are capped with silt; clear and wavy boundary.

C2—43 to 60 inches, olive-gray (5Y 5/2) gravelly coarse sand with lenses of olive-gray (5Y 4/2) loamy fine sand or fine sandy loam; the lenses are slightly firm to firm in place and have a weak, coarse, platy structure; clear sand grains are common between plates; silt caps on many rock fragments; pockets or streaks of light olive brown (2.5Y 5/4) are present in old root channels.

Loamy sand and light sandy loam are the dominant extures. Fine sandy loam to a depth of 12 to 14 nches over loamy sand is within the range of the series. The Gloucester soils are conspicuously stony and boulery throughout the profile. Surface stoniness ranges rom nearly nonstony, in areas cleared of stones, to exremely stony. The proportion of coarse fragments of gravel size in the solum generally ranges from about 15 o 35 percent, but is as much as 50 to 60 percent in places. The C horizon, to a depth of at least 3½ or 4 feet, is gravelly loamy sand or sand with thin lenses of slightly firm, finer textured material. In places a firm horizon is below a depth of 3½ or 4 feet. Yellow streaks, probably of material from the B horizon, are common along root channels in the C horizon.

The Ap and A1 horizons have a hue of 10YR with a value of 2 to 3. The B horizon has a hue of 10YR or 7.5YR in the upper part, and this grades to 10YR or 2.5Y in the lower part. The value ranges from 4 to 6 and the chroma from 3 to 8. The C horizon commonly has a hue of 10YR, 2.5Y, or 5Y.

Scantic River Watershed Project

Your Lawn:
Simple Ways To Improve Water Quality

This bulletin presents information about simple things you can do around your home or landscape to improve water quality in the Scantic River Watershed. It addresses two sources of pollution resulting from residential land use:

- Fertilizers, and
- Pesticides

With excessive use of fertilizers and pesticides your lawn may become a source of pollutants. A carefully planned lawn maintenance program will improve your lawn's health and protect water quality.

Nutrients and pesticides can persist in the environment for months or years. Recent evidence from Connecticut watershed studies demonstrates that pollutants in groundwater can discharge into rivers and streams, sometimes years after they are first released into the environment.

Surface runoff may also carry pollutants to rivers and streams. Levels of pesticides and nutrients usually increase in watercourses after heavy rainfalls. These spikes can be toxic to fish and other aquatic life.

Phosphorus
One of the principal nutrients in fertilizers, phosphorus is a concern when introduced to freshwater systems, especially ponds, lakes, and reservoirs. An over-abundance of phosphorus can cause algal blooms. Blooms in late summer can deplete oxygen and lead to a condition called *hypoxia*, the absence of oxygen. Phosphorus is often attached to soil particles. Therefore, preventing erosion can be an important factor in preventing pollution. This is especially critical in the Scantic River watershed which is characterized by highly erodible soils called *terrace escarpments*.

Nitrogen
Nitrogen is a common pollutant found in Long Island Sound. Some of this nitrogen is discharged from the Connecticut River, which carries run-off water from the entire watershed, including water contributed by the Scantic River. According to a recent study in Manchester, CT by the US Geological Survey, the most likely source for high nitrate levels in groundwater "is fertilizer application to lawns and gardens".

Pesticides
Pesticide residues are found in soil, surface water, and ground water. Not all have harmful effects in the environment, or on human health. However, some common pesticides available for lawn and garden use are toxic to fish and birds.

Homeowners can use Integrated Pest Management (IPM) to control pests and reduce pesticide use. IPM uses a variety of strategies to control pests. Chemical pesticides may be used in an IPM program, but usually as a last resort after other methods have failed. IPM measures protect the environment and may significantly reduce pesticide and fertilizer use around the home.

Written by David Askew, Tolland County Soil and Water Conservation District (860-875-3881, ext. 108), and Dana Karpowich, University of Connecticut Cooperative Extension Service, in cooperation with Hartford County SWCD.

Funded in part by the CT DEP through a US EPA nonpoint source grant under section 319 of the Clean Water Act.

Reducing Fertilizer Use

Fertilizer can leach into groundwater or run-off lawns under certain conditions. Steep slopes, sandy soils, poor vegetative cover, compacted soil, and frozen ground will all increase leaching or runoff.

Lawn fertilizers can be either water soluble/quick release or water insoluble/slow release. Slow release forms require only one or two applications per year and reduce the likelihood of burning the lawn. In contrast, water soluble fertilizers require numerous and more frequent applications. Water soluble forms "green-up" lawns more quickly, but are prone to leaching.

Slow release fertilizer should be applied to the lawn in late May and again in early September. For a one-time application, apply fertilizer in early September. Slow release fertilizers include natural organic fertilizers such as composted animal manure, spent mushroom compost, and leaf compost. These products can be used as a substitute for slow release synthetic fertilizers.

Knowing the properties and nutrient levels in your soil is essential for managing fertilizer. Soil test kits are available through the University of Connecticut Cooperative Extension System or the UCONN Soil Testing Lab. The laboratory will report soil type, pH, and fertilizer and limestone recommendations specific for your soil.

The Alternative

Many homeowners around the country are abandoning the traditional lawn and adopting native landscaping techniques to improve their yards.

Lawns now cover more area in the U.S. than any other single crop and have contributed to the displacement of numerous native species of plants and animals. Lawns support fewer bird and animal species than a comparably diverse native meadow or woodland. In addition, native plants have evolved in New England and are more tolerant of its climate and may be more resistant to native pests.

The benefits of native landscaping include:

- Reduced fertilizer and pesticide applications;
- Reduced cost, time, and energy for maintenance;
- Improved habitat for birds and other native wildlife;
- Reduced reliance on maintenance machinery (lawnmowers, weed-trimmers etc.) which contribute to air pollution;
- Reduced introduction of non-native species.

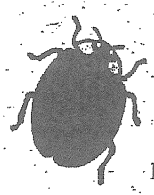
Native landscape plans can be designed for a wide variety of uses. The wide open spaces often desired by homeowners can be achieved by using native grasses (Little bluestem, Big bluestem, Red Fescue, Switchgrass) or wildflowers. Open areas that are only periodically mowed can benefit grassland bird species, which have declined in New England with the loss of farmland.

Fruiting shrubs are one of the best ways to enhance the habitat value of your yard and reduce lawn area. Native shrubs such as blueberry, serviceberry, dogwoods, native cherry, winterberry, and highbush cranberry provide food and cover for birds and other wildlife.

Native landscaping can reduce the time and energy spent on yard care, reduce fertilizer and pesticide use, create more interesting yards, and improve habitat on even the smallest parcel of land.

No or Low Fertilizer/Pesticide Zones

Streams, swales, drainage ditches or wet areas indicate either a high water table or surface drainage. Lawns next to these resources must be treated with special care because of their proximity to water. These areas should be managed by timing fertilizer and pesticide applications to avoid rain events for at least one week. Fertilizer and pesticide applications should also be eliminated or reduced within 25 feet of a stream or wet area to avoid direct contamination. The most effective way to manage these areas is to allow them to re-vegetate naturally to provide a shrub or wood buffer. Reducing the amount of lawn by any amount along the stream or wet area will benefit water quality.



Reducing Pesticide Use with Integrated Pest Management (IPM)

Increasingly, homeowners are concerned about the use of pesticides around the home. Managing a lawn without depending on pesticides can be achieved by using Integrated Pest Management (IPM).

IPM is not a single practice. Instead, a variety of methods are used. The use of pesticides may be a part of an IPM approach. However, they are typically used only after other methods have proven ineffective. When pesticides are used, the safest and most effective pesticides are chosen.

The goals of IPM are to:

- Protect human health and the environment;
- Maintain safe and sustainable landscapes;
- Reduce the use of fertilizer and pesticides.

IPM uses a combination of management strategies to control pest, including:

- Cultural controls or practices
- Resistant varieties
- Pest Identification and Monitoring
- Physical removal
- Biological control
- Weather monitoring
- Pest trapping
- "Natural" pesticides
- Chemical Control

The references listed on the back page of this document provide additional details of specific methods of IPM. Two of the more easy-to-use methods are discussed below:

Cultural Practices

Proper fertilization, watering, and mowing are perhaps the most important practices in IPM. A healthy, vigorous lawn will resist pest infestation and disease. Conversely, a neglected lawn will attract pests. Proper mowing will produce a thick dense lawn, discourage weeds, and recycle nutrients. Mowing should be done frequently so that no more than one-third of the leaf blade is removed at each cutting.

Always mow when the grass is dry. Mowing wet grass can spread disease and cause grass clippings to clump and smother living grass. Cutting should be at a height of 1.5 to 2 inches in the spring and fall and 3 inches in the summer.

Lawn clippings return up to 50% of the nitrogen back to the lawn and do not contribute to the accumulation of thatch. Don't remove them unless infrequent mowing produces a large accumulation.

A properly watered lawn is more vigorous and resistant to pesticides. The general rule-of- thumb is to water well, but infrequently, no more than once or twice a week. Frequent and light watering produces shallow rooted grass.

Monitoring

Pest monitoring combined with physical removal by hand or spot treatment is another effective method used in IPM. By monitoring your lawn and identifying problem areas, you can reduce pesticide use by only treating small areas or remove pests by hand. It is unusual to have a whole lawn infested with a single pest, so whole-lawn treatment is usually unnecessary. Local treatment may also reduce the likelihood of pests developing resistance to pesticides.

Using IPM and reducing pesticide use may require an adjustment in your expectations for a traditional lawn. Some IPM methods take time and you may have to accept occasional weeds or pests. However, these must be measured against the many benefits of reducing pesticide use.

IPM has been proven to work even with production agriculture. Corn growers and other producers in the Scantic and Housatonic River basin were able to reduce their use of pesticides by almost 6000 pounds (active ingredient) in 1996, with no loss in production.

Finally, many commercial lawn maintenance companies now specialize in low-pesticide lawn care and may assist you with developing an IPM program for your home and lawn.

Lawn care information from your local conservation district!

Postal Customer

TOLLAND COUNTY SOIL & WATER
CONSERVATION DISTRICT
24 HYDE AVENUE
VERNON, CT 06066
TEL: (860) 875-3881 EXT 108

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Sally L. Taylor, Glenn D. Dreyer, W.A. Niering
The Connecticut College Arboretum
Bulletin number 30, (September 1987)

Enhancing Your Backvard Habitat for Wildlife
CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Natural Resources Wildlife Division
79 Elm Street, Hartford CT 06071
Recommended –information for improving native Connecticut habitats

Xeriscape: Water Conservation Through Creative Landscaping
CT Section American Waterworks Association and Portland Water Supply Division
265 Main St. Portland, CT.

A Wild Lawn Handbook – Alternatives to the Traditional Front Lawn
STEVE DANIELS
MacMillan Publishing, N.Y., 1995

Our Environment begins with Your Yard
USDA, NATURAL RESOURCES CONSERVATION SERVICE (pamphlet 1998)
Includes a list of plants that repel insects

Horticulture Fact Sheets Available from University of Connecticut Cooperative Extension System Home and Garden Center: (860-486-6272):

No.	Title
13.	Insects and Other Common Pests of Lawns
14.	Clover Mites and Their Control
18.	Moss in Lawns: Cause and Corrective Measures
23.	Lawn and Shade Problems and Corrective Measures
37.	Controlling Insects and Other Common Pests of Lawns
39.	Beneficial Nematodes
50.	Thatch-Problems and Corrective Measures
58.	Lawn Construction and Maintenance

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B21—6 to 12 inches, dark yellowish-brown (10YR 4/4) light sandy loam; breaks into very soft subangular clods that are very friable; 15 to 20 percent coarse skeleton; clear, wavy boundary.

B22—12 to 19 inches, yellowish-brown (10YR 5/6) loamy sand or loamy fine sand; massive; very friable; 15 to 20 percent coarse skeleton; clear, wavy boundary.

B23—19 to 23 inches, yellowish-brown (10YR 5/4) loamy sand; very friable to loose; about 20 percent coarse skeleton; clear, wavy boundary.

C1—23 to 43 inches, light-gray (10YR 7/1) and olive-gray (5Y 5/2) gravelly loamy coarse sand or coarse sand with a few streaks of olive brown (2.5Y 4/4) in root channels; slightly firm in place when dry, but very friable to loose when moist; some stone fragments are capped with silt; clear and wavy boundary.

C2—43 to 60 inches, olive-gray (5Y 5/2) gravelly coarse sand with lenses of olive-gray (5Y 4/2) loamy fine sand or fine sandy loam; the lenses are slightly firm to firm in place and have a weak, coarse, platy structure; clear sand grains are common between plates; silt caps on many rock fragments; pockets or streaks of light olive brown (2.5Y 5/4) are present in old root channels.

Loamy sand and light sandy loam are the dominant extures. Fine sandy loam to a depth of 12 to 14 nches over loamy sand is within the range of the series. The Gloucester soils are conspicuously stony and boulery throughout the profile. Surface stoniness ranges rom nearly nonstony, in areas cleared of stones, to exremely stony. The proportion of coarse fragments of gravel size in the solum generally ranges from about 15 o 35 percent, but is as much as 50 to 60 percent in places. The C horizon, to a depth of at least 3½ or 4 feet, is gravelly loamy sand or sand with thin lenses of slightly firm, finer textured material. In places a firm horizon is below a depth of 3½ or 4 feet. Yellow streaks, probably of material from the B horizon, are common along root channels in the C horizon.

The Ap and A1 horizons have a hue of 10YR with a value of 2 to 3. The B horizon has a hue of 10YR or 7.5YR in the upper part, and this grades to 10YR or 2.5Y in the lower part. The value ranges from 4 to 6 and the chroma from 3 to 8. The C horizon commonly has a hue of 10YR, 2.5Y, or 5Y.

GeE GLOUCESTER AND CHARLTON VERY STONY SOILS, 15 TO 35 PERCENT SLOPES This map unit consists of deep and very deep moderately steep to steep, well drained soils on ridges, hills, and side slopes of glacial till uplands. The areas are mostly long and narrow in shape. Slopes are mostly smooth and convex and are mainly less than 200 feet long. Stones cover 8 to 25 percent of the surface. About 45 percent of the total acreage of this map unit is Canton soils, 40 percent is Charlton soils, and 15 percent is other soils. The water table in these Canton and Charlton soils is commonly at a depth of more than 6 feet. The permeability of the Canton soils is moderately rapid in the surface layer and subsoil and rapid in the substratum. The permeability of the Charlton soils is moderate or moderately rapid. Both soils have moderate available water capacity and rapid runoff.

SwB

51B

SwB - Sutton fine sandy loam, 2 to 8 percent slopes, very stony

This nearly level to gently sloping moderately well drained soil is on upland glacial till plains, hills, and ridges. Stones and boulders cover 1 to 8 percent of the surface. Areas are dominantly irregular in shape.

Typically, this Sutton soil has a very dark grayish brown, fine sandy loam surface layer 4 inches thick. The subsoil is yellowish brown, dark yellowish brown, and dark brown, mottled fine sandy loam and sandy loam 29 inches thick. The substratum is olive brown, mottled sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of well drained Canton and Charlton soils; moderately well drained Woodbridge soils; and poorly drained Leicester soils. Included areas make up about 10 percent of this map unit.

The Sutton soil has a seasonal high water table at a depth of about 18 inches. Permeability is moderate or moderately rapid. The available water capacity is moderate. Runoff is slow or medium. Sutton soil warms up and dries out slowly in the spring.

The major limiting factor for community development is the seasonal high water table. Onsite septic systems need special design and installation to prevent effluent from seeping to the surface. Foundation drains help to prevent wet basements. Lawns are wet and soggy in the fall and spring. Quickly establishing a plant cover and using mulch, temporary diversions, and sediment basins to help control erosion during construction.

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.