MAPLEWOODS SUBDIVISION

MANSFIELD, CONNECTICUT

FEBRUARY 1989

EASTERN CONNECTICUT ENVIRONMENTAL REVIEW TEAM REPORT

EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

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REVIEW DATE: JULY 21, 1988

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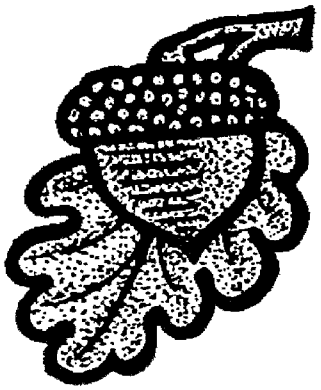

EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

EASTERN CONNECTICUT ENVIRONMENTAL REVIEW TEAM
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ENVIRONMENTAL REVIEW TEAM REPORT
ON

MAPLEWOODS SUBDIVISION
MANSFIELD CONNECTICUT

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

The ERT met and field checked the site on Thursday, July 21, 1988. Team members participating on this review included:

Don Capellaro	Principal Sanitarian	CT Department of Health
Kevin DesRoberts	Wildlife Assistant	DEP-Eastern District
Steve Hill	Wildlife Biologist	DEP-Eastern District
Dan Mayer	Environmental Analyst	DEP-Water Resources
Ken Metzler	Sr. Environmental Analyst	DEP-Natural Resources Center
Brian Murphy	Fisheries Biologist	DEP-Eastern District
Joyce Purcell	Soil Conservationist	USDA-Soil Conservation Service
Elaine Sych	ERT Coordinator	Eastern CT RC&D Area
Bill Warzecha	Geologist	DEP-Natural Resources Center

Prior to the review day, each Team member received a summary of the proposed project, a list of the town's concerns, a location map, a topographic map, a soils map and a schematic plan. During the field review the Team members were given new topographic maps, and a report on soils and water quality. The Team met with, and were accompanied by the Town Planner,

members of the Planning and Zoning and Inland Wetlands Commission, a planner from the Regional Planning Agency, an adjacent property owner, the developer and his soil scientist, engineers and environmental consultant. 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 designs or detailed solutions to development problems. The Team does not recommend what final action should be taken on a proposed project -- all final decisions rest with the Town and landowner. This report identifies the existing resource base and evaluates its significance to the proposed development, and also suggests considerations that should be of concern to the developer and 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 making your decisions on this proposed subdivision.

If you require additional information, please contact:

Elaine A. Sych
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1. SETTING, LAND-USE AND TOPOGRAPHY

The site, about 210 acres in size, is located approximately 5,000 feet south of Route 275 and is on the west side of Maple Road. The site abuts Maple Road on the east, and largely private, undeveloped land on the south, north and west. A natural gas pipe line traverses the southcentral parts of the site. Also, a white cedar swamp, which has local significance abuts the southern parts of the site.

It is understood that the site located in a R-AR40 Zone, which would allow residential development with minimum lot sizes of 40,000 square feet (30,000 square feet has to be contiguous with no wetlands). Each lot would be served by an individual on-site septic system and well. Because plans are preliminary the exact number of lots proposed is unknown, but for purposes of this review the plans showed 55 lots.

Based on visual observation and review of aerial photographs, the land in the eastern portions of the site, mainly along Maple Road, has an agricultural past. The boundaries for farm fields and woods line on the site have not changed drastically from 1934 to the present. Generally speaking, land use changes in the vicinity have included a decrease in actively farmed acreage, an increase in residential development, and an increase in area covered by paved roads. Although plans are preliminary, it appears that two access roads will be provided off of Maple Road, which will generate three cul-de-sacs. Based on the preliminary road layout, regulated wetland soils will not be covered in order to construct roads. Three major wetland areas have been identified on the site by the applicant's soil scientist.

The parcel consists of an area of hummocky and irregular topography situated between Ball Hill and Spring Hill. Site

elevations range from a high of 660 feet above mean sea level in the central portions to 520 feet above mean sea level at the wetlands in the northern parts. Slopes generally range from gentle to steep. The steepest slopes occur along the north side of the wetland area at the southern limits. The latter area is controlled by the underlying bedrock and contains numerous bedrock exposures. The northern limits also contain areas of moderately steep slopes.

2. GEOLOGY

The subdivision site is located in the Spring Hill and Coventry topographic quadrangles. Most of the site (central and eastern portions) lies in the Spring Hill quadrangle, while the remainder (western parts) lies within the Coventry quadrangle. A surficial geologic map (QR-26, by P.H. Rahn) has been prepared for the Spring Hill quadrangle. No bedrock geologic map has been prepared for the Spring Hill quadrangle to date. Neither a surficial nor bedrock geologic map have been prepared for the Coventry quadrangle. There is, however, preliminary information for both maps at DEP's Natural Resource Center in Hartford. The Team's geologist referenced John Rodgers' Bedrock Geological Map of Connecticut (1985) and the Soil Survey for Tolland County for the geology section of this report.

Rodgers' (1985) identifies the bedrock underlying most of the site (central and southern parts) as the Yantic Member of Tatnic Hill Formation. It is described as a gray to dark gray, fine to medium grained schist. The northern limits are underlain by Hebron Gneiss, an interlayered dark gray schist and greenish gray calc-silicate gneiss.

The terms gneiss and schist used above refer to the textural aspect of the rocks. Both are metamorphic, which

means they were geologically altered by intense heat and pressures within the earth's crust. Gneisses are generally medium to coarse grained, foliated rocks characterized by alternating bands of light and dark minerals. Schists are generally cleavable rocks with layering, defined by parallel arrangement of platy or flaky minerals.

The depth to bedrock is unknown on the sites. Except for the portion of the site that encompasses the streamlined hill at the southeast limits, it probably does not exceed 10 feet in most places. The bedrock surface may be as much as 40 feet below ground level in the southeast corner. As mentioned earlier, bedrock is exposed in the southcentral parts.

It should be noted that two east/west trending fault zones have been identified at the northern and southern parts of the site. In general, they are aligned with the two major wetland/streamcourse systems on the site. Because they traverse the site, there is a chance the underlying bedrock has been fractured and the uppermost part of the bedrock surface weathered. It should be noted that the mapped fault zones are structural features which formed during the geologic past and are no longer experiencing active movement.

The underlying bedrock is the principal sources of water to residences throughout Mansfield. It will also be the source of domestic water to homes in the proposed subdivision. (See WATER SUPPLY section).

Except for a very small patch of sandy, gravelly deposits at the northern limits near Maple Road, the site is covered by glacial sediments called till. Till is a glacial sediment that was deposited directly by glacial ice. The sediment consists of varying proportions of sand, silt, gravel, clay and boulders. Particles of difference sizes are generally mixed together in a complex fashion. According to the soil survey for Tolland

County, the texture of the till on the site ranges from sandy, stony to very stony and moderately loose to silty, moderately stony and compact. The latter variety of till is characterized by a "hardpan" layer which has developed at a relatively shallow depth (1.5-2.0 feet below ground surface). Because of the low permeability of the "hardpan" layer, the soil zone above the hardpan layer, which is more permeable, often becomes saturated with groundwater during the wet time of year. This condition often results in a seasonal high groundwater table. On the other hand, the sandy, moderately loose variety of till found on the site generally lacks the compact soil zones and occurs in areas where bedrock is relatively close to the ground surface. A seasonally high water table is not usually characterized by these soils.

The "hardpan" soils are found mainly on the streamlined hill in the southeast corner. The looser variety of till covers the reminder of the site.

As mentioned above, a small patch of sandy, gravelly material occurs at the northern limits. These deposits were laid down by glacial meltwater deposits. Sand and gravel are the major component of the stratified drift. The exact thickness of the sand and gravel is unknown, but is not expected to be too great, probably 10 feet or less.

Overlying the till and/or stratified drift throughout the site are regulated inland wetland soils. Two large wetland areas have been identified in northern and southcentral parts. The latter wetland comprises peat and muck. The remaining wetland soils comprise Lg soils or (Leicester, Ridgebury and Whitman, very stony fine sand loams), which generally parallel watercourses on the site. The wetlands have been delineated by a certified soil scientist. These boundaries have been superimposed onto a 2 foot contour interval map of the property.

It appears that the major wetlands on the site would have good flood control and sediment retention attributes. The wetlands that parallel the streamcourses on the site act as conduits transporting surface runoff from the upland sections. Because of these attributes and because the water table in these areas is at or near ground surface for most of the year, development of these areas should be avoided. Severe wetness in these areas would make construction of any type difficult.

Since detailed plans have not been prepared to date, it is not known if any type of activity will take place in regulated wetland soils. Because these soils are classified as inland wetland soils in Connecticut, they are regulated under Public Act 155. Any activity which involves modification, filling, removal of soils, etc., will require a permit and ultimate approval by the Inland-Wetland Commission. In reviewing a proposal, the Commission needs to determine the impact that the proposed activity will have on the wetlands. If the Commission determines that the wetland is serving an important hydrological or ecological function and that the impact of the proposed activity will be significant, they may deny the activity altogether or, at least, require measures that would minimize the impact. It would be helpful to Commission members if the applicant's technical staff included information on the site plan such as: 1) quantify the amount of fill to be placed on regulated soils; 2) fill lines; and 3) type of fill material to be used, etc. There is also a need to determine the relative importance of the regulated wetlands and watercourses so that a sound decision can be made by the Commission.

Special attention should focus on the ability of the disturbed wetlands areas to: 1) provide flood storage; 2) trap sediment; 3) clean in-flowing water; and 4) provide habitat for wildlife. Also, consideration should be given to the effects of

any wetland activity off-site, especially to the white cedar swamp.

3. SOIL RESOURCES

General Soils Information:

The information contained in the Soil Survey of Tolland County, CT appears to be adequate for planning purposes. If the Commission requires additional information it is suggested that the applicant retain the services of a qualified private soil scientist to review the information contained in the Soil Survey of Tolland County, CT, examine conditions in the field and provide the Commission with a verified map and up to date interpretative information for the site. (See below)

Wetlands Boundary Information:

Wetlands on this site had been field delineated, but the plan map showing the field delineations were not available at the time of review. The Commission should require that the applicant have this information surveyed onto the plan map. The soil scientist should then review and sign a statement on the map(s) certifying that the information is substantially correct. The certification statement should be similar to the following: "The wetland soils on this site were identified in the field using the criteria required by Connecticut P. A. 72-155 as amended by Conn. P.A. 73-571, Conn P.A. 87-388 and P.A. 87-533. The boundaries of these soils and of identified watercourses are accurately represented on the plot plan."

If discrepancies are found the Tolland County Soil and Water Conservation District can, on request, review the submitted information for adequacy.

4. SOIL EROSION AND SEDIMENT CONTROL PLAN

A detailed soil erosion and sediment control plan should be developed and implemented for this site. The plan should be developed using the criteria contained in The Connecticut Guidelines for Soil Erosion and Sediment Control (1985). The Tolland County Soil and Water Conservation District would appreciate the opportunity to review this plan prior to final approval.

One of the primary objectives of the soil erosion and sediment control plan should be to prevent siltation of the wetland areas and scouring of stormwater outlets, and downstream areas. It is suggested that the applicant submit information on projected Q's and V's for 2, 10 and 25 year Type III plan. Runoff calculations were not submitted for review, therefore the effects of stormwater on wetland areas could not be assessed. Calculations should be developed using the appropriate method selected from Chapter 9 of The Connecticut Guidelines for Soil Erosion and Sediment Control (1985).

Another primary objective is to protect the White Cedar Swamp that has been identified on the southeastern perimeter of the property and other abutting property. The potential for damages to this sensitive area from sediment and increased runoff need to be addressed.

Due to the magnitude of this proposal, the wetland areas on site, and the proximity of the White Cedar Swamp, phasing the project in a manner to minimize the potential of soil erosion and sedimentation should be proposed and considered by the applicant. Phasing, which allows for clearing, grading, and the stabilization of one portion of the site before clearing and

grading begins on another, will limit the number and severity of erosion problems. By properly phasing proposed construction activities, both the extent of exposed ground and the duration of exposure can be minimized.

5. HYDROLOGY

Drainage within the parcel can be divided into two areas. Surface runoff arising in the southern half of the parcel lies within the drainage areas of Sawmill Brook. Most of the runoff flows into the wetland mapped in the southcentral parts of the site. It appears that this wetland has two outlets; one at the western end and the other on the south. The outlet at the southern parts empties into Cedar Swamp which forms the headwater region for Sawmill Brook. The western outlet for the swamp, which is unnamed, flows westward enroute to the Willimantic River. Since a major concern of the Town is to protect Cedar Swamp, the applicant's staff should accurately determine the surface hydrology of the wetland, especially the two outlets. It should be noted that the southern limits of the site drains directly to Cedar Swamp.
Surface runoff arising in the northern half of the parcel flows northward to a Dunham Pond Brook tributary, which is unnamed. Dunham Pond Brook ultimately flows into the Willimantic River.

Development of the site for residential use under the anticipated densities would be expected to lead to some increases in the amount of runoff shed from the site. The amount of increases will depend upon the extent of development, the impervious surfaces created such as roads, rooftops, etc., and the amount of vegetation removed or preserved. The two major concerns with increased runoff on the site is the potential for flooding to downstream areas and streambank erosion.

Regarding the potential for downstream flooding, the applicant's engineer has not provided information regarding the effect of stormwater to downstream areas (as of the field review date). Runoff calculations and stormwater drainage plans were not submitted for review by Team members. Drainage calculations, an assessment of potential downstream impacts and plans for control of stormwater should be developed and submitted for review by Town officials. It is suggested that drainage calculations should be developed using the appropriate methods indicated in Chapter 9 of the Connecticut Guidelines for Soil Erosion and Sediment Control, 1985.

Because the property is located within two drainage areas it is expected that this will help to allay the potential impacts of flooding to downstream areas. The major wetland in the southern parts as well as a significant wetland west of the site are both in hydrologic positions to help detain increased runoff during storm events. As mentioned earlier, every effort should be made to protect Cedar Swamp from the impacts of residential runoff. Therefore, the applicant's engineer needs to study the hydrologic connection between Cedar Swamp and the wetland in the southcentral parts. Eliminating the hydrologic connection between the two may have a hydrologic, biologic and ecologic affect on Cedar Swamp. Approximately 107 acres of land drains to the swamp from the southern outlet.

A wetland area south of the intersection of Dunham Pond Brook and the unnamed tributary that originates at the northern limits of the site, are in good hydrologic positions to naturally detain increased runoff from the site before it reaches Route 32. Nevertheless, the applicant's engineer will need to provide drainage calculations for the project before an accurate assessment of the potential for downstream flooding can be made.

The other concern with increased runoff is the potential for streambank erosion and gulleying. In view of the moderate to steep slopes, silty soils and downstream surface water bodies and wetland areas, the potential for erosion related problems in the southern half of the site would be expected to be high. Sandier soils and more gentle slopes predominate in the northern parts, which should help to minimize erosion problems. Nevertheless, a comprehensive erosion and sediment control plan should be developed for the subdivision and enforced by the town.

In order to protect the quality of water in drainageways on the site and surface water bodies and wetland areas downstream, it might be wise to install a temporary sediment pool(s) during construction phases. If the sediment pool is constructed, it should be located on upland soils rather than wetland soils. This will help to minimize wetland disturbances. If the primary purposes of a basin is to minimize erosion and sedimentation, the peak discharge from a 2-year and 10-year frequency, 24 hour duration, Type III distribution storms should be analyzed. The Guidelines discussed earlier should also be followed closely with respect to erosion and sediment control.

6. WATER SUPPLY

Since public water lines are not presently available to this site, the principal source of water to homes in the proposed subdivision is the underlying, crystalline metamorphic bedrock. Obtaining water from any given bedrock well will be dependent upon the number and size of water transmitting fractures that are encountered by the well. The crystalline, metamorphic rock underlying the site responds to geologic forces by fracturing, folding and forming distinct open joints. As mentioned earlier, the majority of the rock underlying the site is schist. This type

of rock is characterized by an abundance and a parallel orientation of platy or flaky (mica) minerals and by the ease of parting into thin layers. They respond to geologic forces by slipping and folding along foliation or layered planes. This type of response results in joint openings that are generally smaller and discontinuous compared to other rock types (i.e., gneisses) found in upland areas of Connecticut. If the underlying rock contains continuous and interconnected fractures and joints, then the availability of groundwater for domestic uses should be good.

The yields of a bedrock well(s) cannot be predicted prior to drilling since the size and degree of interconnecting-fractures in the rock below the site are unknown. However, experience has shown that the best yields are obtained in the top 200-300 feet of the bedrock surface. In general, well yields decrease with increased depth. Connecticut resources Bulletin No. 11, which encompasses the site indicates of 134 wells surveyed that tapped crystalline metamorphic rock, 90 percent yielded about 3 gallons per minute or more. Generally speaking, a yield of 2-3 gallons per minute is satisfactory for domestic purposes.

In general, private wells should be located to the high side of lots with proper separating distance from on-site sewage disposal systems and other potential sources of pollution, particularly buried fuel storage tanks. Wells must also be properly separated from water impoundments, watercourses and drains and be protected from surface runoff and erosion problems.

Proper well construction and separating distances in accordance with State Public Health Code, Connecticut Well Drilling Board and any town regulations will allow for adequate protection of the quality of the bedrock aquifer.

Properly constructed drilled wells cased firmly with steel pipe into the underlying rock generally afford the greatest degree of protection against possible sources of pollution. They will also usually allow for more flexibility in actual site placement compared to shallow dug wells. All types of wells are to be constructed by persons who are state licensed for this profession. Proposed well sites should be inspected by the Town sanitarian before the issuance of a permit of approval to actually construct such wells(s). The sanitarian must insure that provisions of the State Public Health Code, State Well Drilling board and local ordinances have been followed.

The natural quality of groundwater should be good. However, in many locations certain rock formations alter the quality of water coming in contact with such. Two of the most common components produced are elevated levels of iron and/or manganese which may affect water quality. There is a good chance that both constituents may occur in the schistose rock underlying the site. As a result, it may be necessary to install appropriate water treatment systems in order to reduce concentration to non-objectionable levels.

Groundwater in the area is classified by the DEP as GA, which means that it is suitable for private drinking water supplies without treatment.

7. SEWAGE DISPOSAL

The soils on the property vary considerably from those which are well drained (Charlton, Hinckley) to those which are underlain by hardpan (Paxton, Woodbridge) or ledge rock (Hollis). The Sutton soil type also has a seasonal high water table, although not a perched condition such as Paxton and Woodbridge have due to the underlying hardpan.

Other than being in the better drained areas of Charlton type soil, the most difficult constraints for sewage disposal will be high ground water conditions and/or shallow depth to ledge rock. To a lesser degree is the relatively slow seepage ability of some soils, slopes, and stoniness.

In general there must be at least 18 inches of unsaturated natural existing soil during the wettest season of the year in order for the surrounding soil to have sufficient capacity to adequately absorb or disperse the expected volume of sewage effluent without creating nuisances or detrimental problems. Of course, not only is unsaturated soil necessary, but to have areas of sufficient size in order to accommodate leach systems of adequate size and configuration. In most cases, where there is an underlying restrictive soil layer, seasonal ground water can usually be controlled by the use of curtain drains and proper surface grading and drainage. This, of course, along with actual system construction (systems should be made large, kept shallow, often it is necessary to elevate in "select" fill material, and spread out along natural contours to meet all required separating distances), will take up a sizable land area. Also, with drains, whether footing, curtain or surface it is important to have access to drainage outlet whether natural or man-made.

In the areas having underlying rock, the bottom area of any leaching system must be located a minimum of 4 feet above ledge rock. Therefore, there should be some 5-6 feet of soil above ledge for system installation. If there is less than 4-5 feet of existing soil over ledge the entire leaching system will then be constructed in fill. Construction, naturally, where sizable areas need to be filled, becomes more critical which should involve closer supervision and inspection to determine proper site preparation. In general, areas subject to shallow or relatively shallow ledge rock may have considerable variations to rock depth in a relatively small area. For this reason

adequate testing should be done for any leaching system where rock is of concern in order to determine a reasonable profile of such underlying rock. Nearby rock outcrops or steep sloping terrain downgrade of leaching areas should also be evaluated.

The consulting engineer provided deep test hole information and, in addition, conducted a hydraulic analysis for several of the more marginal lots. In general, no leaching system should necessarily be approved on the basis of a favorable analysis, unless it can also comply with Public Health Code requirements. In this regard, lots should be subject to percolation tests as well as permeability tests. Those with underlying hardpan soils should have tests performed entirely within the hardpan layer as well as in the overlying soil(s).

8. WETLANDS INFORMATION

Field reviews for this section of the report took place on 07/21/88, a rainy day and 07/28/88, during a dry period of weather. The following is an assessment of the wetlands on the property, and the bordering cedar swamp and some recommendations for future development plans.

Wetland Characteristics:

Most of the wetlands on this site can be described as seepage swamps. Seepage swamps typically occur along seasonally flooded drainageways or on lower slopes which receive groundwater seepage. In these areas, the soils are often stony and have little organic material accumulated in the upper horizons. During the spring and/or after heavy rains, there is often surface water present, but generally it does not stagnate. Red maple, yellow birch and American elm are the

dominant trees, with a dense shrub understory of spicebush mixed with winterberry. In the spring, a dense herbaceous layer of skunk cabbage (Symplocarpus foetidus) and false hellebore (Veratrum viride) is intermixed with cow slip (Caltha palustris), cinnamon fern (Osmunda cinnamomea), sensitive fern (Onoclea sensibilis) and spinulose wood fern (Dryopteris spinulosa). Other herbaceous plants present include jack-in-the-pulpit (Arisaema triphyllum), shining clubmoss (Lycopidium lucidulum), touch-me-not (Impatiens capensis), wood-reed (Cinna arundinacea), violets (Viola cucullata, V. pallens) and sedges (Carex bromoides. C. intumescens and C. stricta).

In areas where water stagnates and organic material accumulates, a different wetland type occurs. On this property, this type of wetland occurs on the extreme southeast corner of the property and is dominated by a dense mixture of deciduous and evergreen trees. The margins are primarily deciduous; red maple, yellow birch and black ash with a dense shrub layer of spicebush, winterberry and sweet pepperbush. In contrast, the interior is dominated by conifers; Atlantic white cedar, hemlock and white pine, allowing little light to reach the ground. The result is an impoverished shrub and herbaceous layer consisting of scattered spicebush, cinnamon fern and Massachusetts fern; and a dense ground cover of Sphagnum moss and liverworts.

Ecological Significance:

Although all wetlands on this site are significant for functions such as wildlife habitat, nutrient retention and sediment trapping of runoff from the uplands, passive recreation, and for visual/esthetic qualities, the ceder swamp is of state-wide significance for its ecological uniqueness.

Atlantic white cedar swamps dot the coastal region of the northeast U.S. from the southern extent of glaciation along Long Island Sound to mid-coastal Maine. Never widely distributed, Atlantic white cedar swamps are increasingly encroached upon

for their valuable lumber, for agricultural purposes and for residential and industrial development.

In Connecticut, thirty nine wetlands contain sizable populations of living cedar; all but six of these wetlands are located east of the Connecticut River. Some sites are in near pristine condition, some are trampled and debris-strewn and some are still being logged. A few are under public ownership, but most have no active conservation management.

The Mansfield white cedar swamp is considered one of the best 15 sites in Connecticut and since the early 1970's has been recognized for its ecological significance when it was included in the Natural Area Inventory of the Connecticut Forest and Park Association. This site was subsequently visited in the early 1980's as an update to the 1972 inventory when a small population of two Plant Species of Special Concern were observed. More recently, this wetland was recommended by the Connecticut Geological and Natural History Survey (CG & NHS) for acquisition by the State Heritage and Recreation Trust, and has been placed on The Nature Conservancy priority list. In 1988, this wetland was included on a draft document entitled "Wetlands of Special Concern in Connecticut", submitted to DEP Commissioner Carothers by the CG & NHS and the CAM/Planning Units of the DEP. In addition, the Town of Mansfield is quite aware of the significance of this site and has taken measures to protect it from encroachment.

Recommendations:

(1) Due to the fact that the applicant has not submitted final or formal site plans, a full and accurate evaluation of the wetland impacts cannot be performed. Therefore, it is suggested that a copy of the final plans be sent to the Natural Resources Center of the DEP, care of Ken Metzler,

for a review of the site layout, including a full hydrologic analysis of existing and proposed conditions.

(2) During the lot layout phase of the project an effort should be made to keep the wetlands under single ownership. The extension of the property boundaries through wetlands lends to their disturbance. If single ownership is not a feasible alternative then the use of conservation easements is highly recommended. Easement conditions should include deed restrictions and the delineation of wetland boundaries in the

(3) All encroachment into or near the cedar swamp should be avoided. In addition, there is an overland hydraulic connection (intermittent drainage swale), between the cedar swamp and the adjacent wetland to the north. Though this swale probably only functions during high flow periods of the year or during storm events, it is a vital feature in maintain the existing hydrologic conditions. This area of critical concern corresponds to lots 7-13 on the previous preliminary concept plan.

(4) The discharge from the stormwater management systems on site should be routed away from the cedar swamp, and any discharge volumes into the adjacent wetlands should be limited and shown not to create any increased flows into the cedar swamp.

(5) In any and all future layout concepts, the developer should attempt to maintain at least minimum 50 foot buffer zone around all wetland areas. Such a buffer will help to reduce encroachment into the wetlands during construction activities and maintain some of the more important wetland-upland transition areas for habitat function.

9. WILDLIFE RESOURCES

Wildlife Habitat Description:

The area of the proposed subdivision currently offers a high diversity of wildlife habitat due to the area's unique topography. Mixed hardwoods, reverting agricultural fields, and wetland/riparian areas are the major habitat types and provide a variety of cover types that support a high diversity of wildlife species.

Mixed hardwoods occur in most of the area north of the pipeline and west of the agricultural fields. A hardwood ridge traverses the pipeline in the western portion. The ridge consists of an oak, ash, and beech overstory, with witch hazel and spice bush dominating the understory. In areas of lower elevation the overstory is dominated by ash, black cherry, and red maple. Understory vegetation consists primarily of red maple seedlings, viburnum, and brambles in wet areas. A variety of ferns, grasses, and sedges occupy the area at ground level.

Reverting agricultural fields are centrally located in the area adjacent to Maple Road. This area consists of an old cornfield and two reverting hay fields. The old cornfield consists primarily of goldenrod, clover, trailing blackberry, and a variety of grasses and sedges. Surrounding the cornfield is a hedgerow consisting of ash and black cherry, with bittersweet, raspberry, blackberry, and grape occupying in the understory. Cardinals, chimney swifts, tree swallows, flycatchers, eastern kingbirds, field sparrows, flickers, and catbirds were observed utilizing this field as a foraging site. The reverting hay fields consist primarily of several species of grass, black cherry seedlings, raspberry, and multiflora rose.

Wetland/riparian areas comprise a large portion of the site. These areas consist of a small pond, a brook, two red maple swamps, and a white cedar swamp. The red maple swamps are dominated by red maple consisting primarily of viburnum and swamp azalea. A good diversity of ferns, grasses, and wetland vegetation occur at ground level. The brook runs in association with the red maple swamp in the northern portion of the property and eventually into Dunham Pond Brook. The white cedar swamp exists in the southwestern corner of the property. This critical wetland area currently supports a high diversity of plant and animal species. A small shallow pond exists in the northeastern portion of the property. The banks of the pond are dominated by speckled alder and a good diversity of aquatic vegetation including cattails and water lily occurs in the pond. A belted kingfisher was observed utilizing the pond as a foraging site.

Wildlife Species:

Bird species inhabiting the area include brown thrashers, flickers, northern orioles, eastern kingbirds, warblers, cardinals, catbirds, mourning doves, tree swallows, chimney swifts, flycatchers, sparrows, chickadees, belted kingfishers and a variety of other songbirds and waterfowl.

Mammalian species consist of white-tailed deer, eastern cottontails, muskrat, raccoon, grey squirrels, mink, red fox, and a variety of other small mammals.

Due to the abundance of wetlands, this area also supports a good diversity of amphibian and reptilian species.

Effect of Proposed Activity on Wildlife:

The proposed development of this property will reduce wildlife habitat, which will in turn reduce species diversity and

richness. Because of the fragmentation and elimination of habitat types there will be a negative impact on many species of wildlife. Interior sensitive species that require large tracts of undisturbed forest such am wild turkey, ovenbirds and veeries will no longer exist in this area. Species that are intolerable to man will be forced to emigrate into adjacent habitats. Species dispersion into adjacent habitats may result in competition with species already occupying the area. Many species will be forced to inhabit less desirable habitat, decreasing survivability. Species more tolerable to man such as starlings, robins, house sparrows, and raccoons may increase in number and become a nuisance to residents.

Since many of the proposed building lots overlap wetland areas there will be a negative impact on these areas if there is any clearing or removal of vegetation. The white cedar swamp is a critical wetland of special concern. This sensitive area is highly diversified in plant and animal life and may be adversely affected by building on lots #6 - #12. It is also planned that storm water will be diverted into the red maple swamp wetland areas. These areas presently provide important habitat for a number of wildlife species and function as areas for absorption of natural runoff. Diverting storm water into these areas will increase water flow and erosion rates, which may alter the present ecological structure and reduce species diversity.

Mitigation of Impacts on Wildlife:

Several measures can be taken to minimize the affect of development on wildlife. Since the development plans are in a preliminary stage, as much of the wetland areas as possible should be designated as open space. Owners on lots adjacent to or containing wetlands should be discouraged from any removal of vegetation within 100 feet of the wetland. These buffer strips will provide important corridors for a number of wildlife species. It would also be beneficial to wildlife if lot #55

was added to the designated open space because of its location between two critical wetland areas, a small pond and brook.

Since many of the proposed building lots are large in size, as much of each lot as possible should be left as wooded area. This will benefit wildlife and be more aesthetically pleasing for the residents of the development. Residents should also be encouraged to plant ornamental shrubs and trees that are resistant to browsing by deer.

10. FISH RESOURCES

Site Description:

The proposed Mansfield Subdivision will house approximately 55 homes on a 210 acre site. Single family homes will be served by on-site septic systems and individual wells. Areas of primary concern from a fisheries standpoint on this parcel are the unnamed tributary of Dunham Pond Brook and the red maple swamp which drains into the Willimantic River.

The unnamed tributary of Dunham Pond Brook on this parcel is a small headwater stream bordered by extensive wetland habitat on each side. Surface waters are classified by the Department of Environmental protection (DEP) as "Class A". Designated uses for this classification are: potential drinking water supply, fish and wildlife habitat, recreational use, and industrial, agricultural supply. It ranges from 3 to 5 feet in width. Bottom substrate is comprised of small cobble (2-12" diameter in size), sand, and gravel. Fisheries habitat mainly exists in the form of shallow riffles. Very little "pool" habitat was observed. Riffles are fish habitats used as feeding areas where as pools are used by fish as resting and hiding areas. The stream is subject to periodic flood events. A well-developed

tree canopy was observed. Overhead tree canopy provides vital shading and cooling of stream waters.

Fish Population:

The exact fish assemblage of the unnamed tributary of Dunham Pond Brook is unknown. Fish expected to inhabit the dominant riffle type stream habitat would be: blacknose dace, longnose dace, white sucker, and tesselated darter. Additionally, since three small ponds drain into this brook, warmwater species of fish such as largemouth bass, bluegill sunfish, pumpkinseed sunfish, and golden shiner may be found. However, growth and survival of these species in a small stream of this size would be very limited. The stream is not stocked with catchable trout by the DEP Bureau of Fisheries.

Impacts:

The following impacts on the unnamed tributary and local wetlands can be expected if proper mitigation controls are not implemented:

1. Construction site soil erosion and sedimentation through increased runoff from unvegetated areas - erosion and sedimentation due to residential house construction has long been associated with stream habitat degradation. In particular, silt deposition will:

* Encourage the growth of rooted aquatic plants and promote filamentous algae growth in streams - eroded soils contain plant nutrients such as nitrates and phosphates. Although algae and aquatic plants require these nutrients for growth, most aquatic ecosystems contain very limited amounts. Consequently, these nutrients act as fertilizers once they are introduced into aquatic habitats resulting in accelerated plant growth.

* Adversely affect "gill" function and impair feeding activities - studies have documented that high sediment concentrations and turbidity will disturb fish respiration and gill function. Fish will be forced to disperse to more desirable environments

* Reduce fish egg survival - adequate water flow, free of sediment particles is required for egg respiration (biological process of extracting oxygen from water) and successful hatching. Silt will smother eggs.

* Reduce aquatic insect production - sediment free water is also required for successful aquatic insect egg respiration and hatching. Aquatic insects are important food items in fish diets. Reduced insect levels will adversely effect fish growth and survival since excessive energy demands are required to locate preferred aquatic insects when populations levels are low.

* Reduce stream pool depth - pools provide cover, shelter and resting areas for fish in stream environments.

* Contribute to the depletion of oxygen - organic matter associated with soil particles is decomposed by microorganisms contributing to the depletion of oxygen in waters overlying sediments.

2. Percolation of septic effluent into streams - individual septic systems can be potentially dangerous to stream and pond environments. Nutrients and assorted chemicals that may be placed in septic systems could enter aquatic environments in the event of a failure or infiltrate the groundwater during the spring when water tables are close to the surface. The introduction of septic effluent could result in a major threat to fish habitat, public health, and overall water quality conditions. Effluent will

also stimulate the growth of nuisance aquatic vegetation and algae.

3. Degradation of wetland habitat - proposed building lots will be constructed adjacent to important wetland habitat along the unnamed brook, the red maple swamp, and the white cedar swamp. Wetlands are beneficial in many ways. They serve to: (1) control flood waters by acting as a water storage basin, (2) trap sediment from natural and man-made sources of erosion, and (3) help filter out pollutants from runoff before they enter watercourses. Any filling or partial destruction of natural wetland habitat may hinder its filtration function.

4. Aquatic habitat degradation due to the influx of stormwater drainage - stormwaters that contain pollutants such as salt, gasoline, oil, and other pollutants that may be spilled on impervious surfaces can be quickly introduced into the brook and cause water quality and aquatic habitat degradation. Fine silts in stormwaters that remain in suspension for prolonged periods of time cannot be effectively removed from stormwaters. Stormwater runoff will eventually fertilize stream waters and result in overall water quality degradation. Spilled petroleum based chemicals or other toxicants can result in partial or complete fishkills.

5. Transport of lawn fertilizers and chemicals to streams runoff and leaching of nutrients from lawn fertilizers will stimulate filamentous algae growth in streams and degrade water quality. Introduction of lawn herbicides may result in "fish kills" and water quality degradation.

6. Impacts to downstream environments - since both the unnamed brook and red maple swamp drain into the Willimantic River, any water quality problems and habitat degradation that directly occurs in these areas may eventually be observed in downstream sections of the Willimantic River. The Willimantic

River is one of the finest trout streams in Eastern Connecticut. It is actively managed by the Bureau of Fisheries for holdover brown trout.

Recommendations:

The wide ranging impacts may be somewhat minimized by implementing the following suggested recommendations:

1. Develop an aggressive and effective erosion and sediment control plan - install and maintain proper erosion and sedimentation controls during site construction activities. This includes such mitigative measures as filter fabric barrier fences, staked hay bales, and catch 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 Town of Mansfield should have an appointed official that would be responsible for checking this development on a periodic basis to ensure that contractors have complied with all stipulated mitigation devices. Past stream siltation disturbances in Connecticut associated with residential housing developments have occurred when individual contractors either improperly deployed mitigation devices or failed to maintain these devices on a regular basis.

2. Maintain at the minimum a 100 foot open space buffer zone along the edges of the wetland adjacent to the unnamed tributary of Dunham Pond Brook, the red maple swamp, and the white cedar swamp - research has shown that buffer zones will help prevent surface runoff and other pollutants from entering streams and aquatic habitats (USFWS 1984;USFWS 1986;ODFW 1985). Buffer zones can be one of the most effective measures to mitigate the adverse impacts of residential housing development.

3. All individual septic systems should be properly located and designed - the addition of septic effluent to streams can be one of the greatest threats to stream ecology. Septic systems should be maintained on a regular basis. Prevent the disposal of harmful chemicals into septic systems which may negatively effect operation and possibly result in system failure. The use of nonphosphate laundry detergents should be encouraged by all subdivision residents.

4. Design an effective stormwater management plan - properly design, locate, and maintain roadway catch basins to ensure the proper management of stormwaters. Stormwaters should not be directly outletted to aquatic environments. Maintenance is also very critical. The Town of Mansfield should regularly maintain all catch basins to minimize adverse impacts to aquatic environments. Street sweeping should occur in the spring to clean away road sands and other debris. Roadway catch basins can trap most sediments reducing the likelihood of excessive stream sedimentation; however, waters that contain pollutants such as salts and even small amounts of fine enriched sediments will eventually cause water quality and aquatic habitat degradation. This impact can not be prevented.

5. Limit liming, fertilization, and the introduction of chemicals to subdivision building lots next to aquatic environments - this will help abate the amount of additional nutrients to the streams. Non-phosphorus lawn fertilizers are currently available from various lawn care distribution centers.

Bibliography:

ODFW (Oregon Department of Fish and Wildlife) 1985. The Effects of Stream Alterations on Salmon and Trout Habitat in Oregon. Oregon Department of Fish and Wildlife, Portland, Oregon. 70 pp.

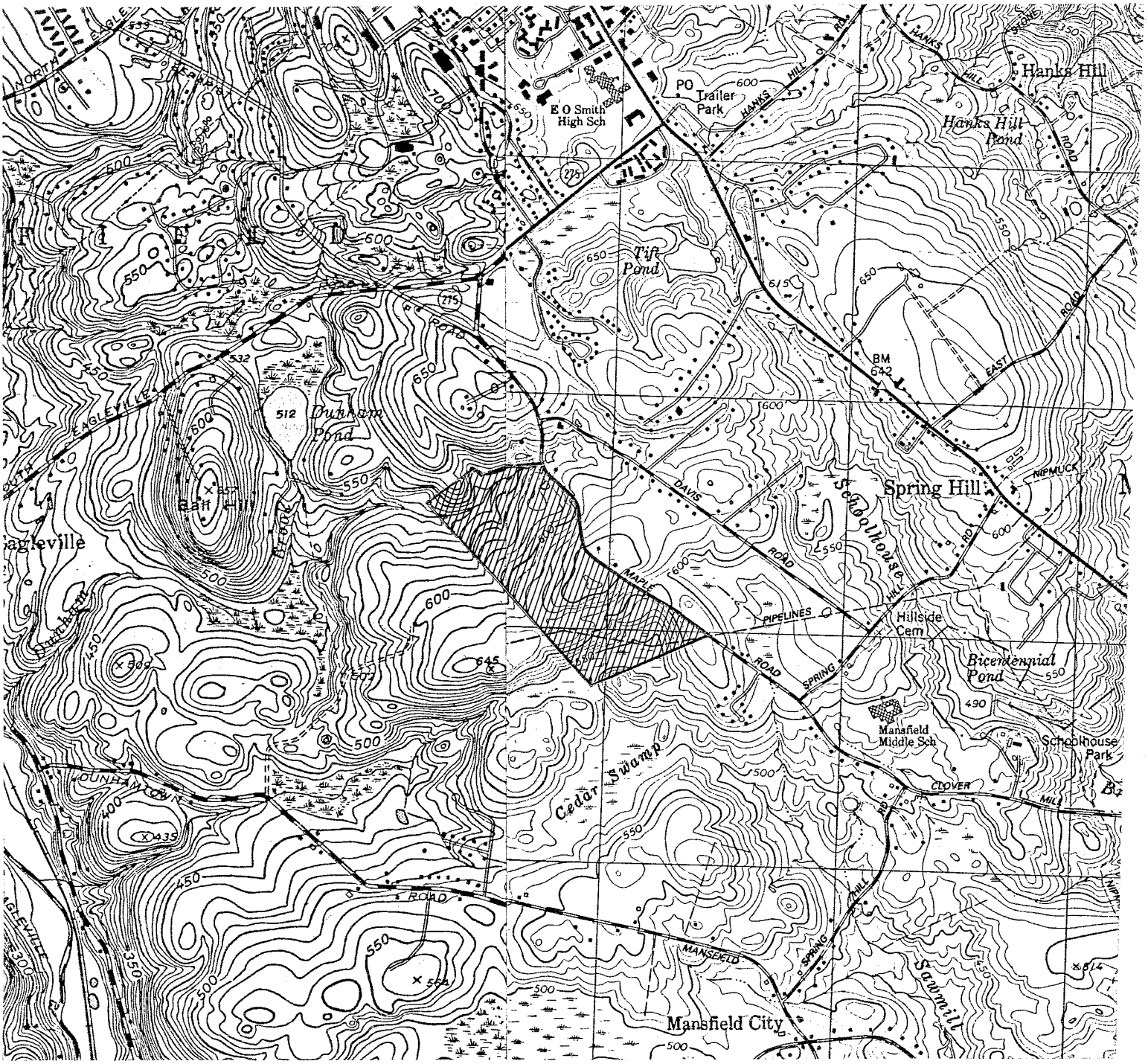
USFWS (United States Fish and Wildlife Service) 1984. Habitat Suitability Information: Rainbow Trout. United States Fish and Wildlife Service, Biological Report FWS/OBS-82(10.124). 64pp.

USFWS (United States Fish and Wildlife Service) 1986. Habitat Suitability Index Models and Instream Flow Suitability Curves: Brown Trout. United States Fish and Wildlife Service, Biological Report FWS/OBS-82/(10.60). 65pp.

LOCATION

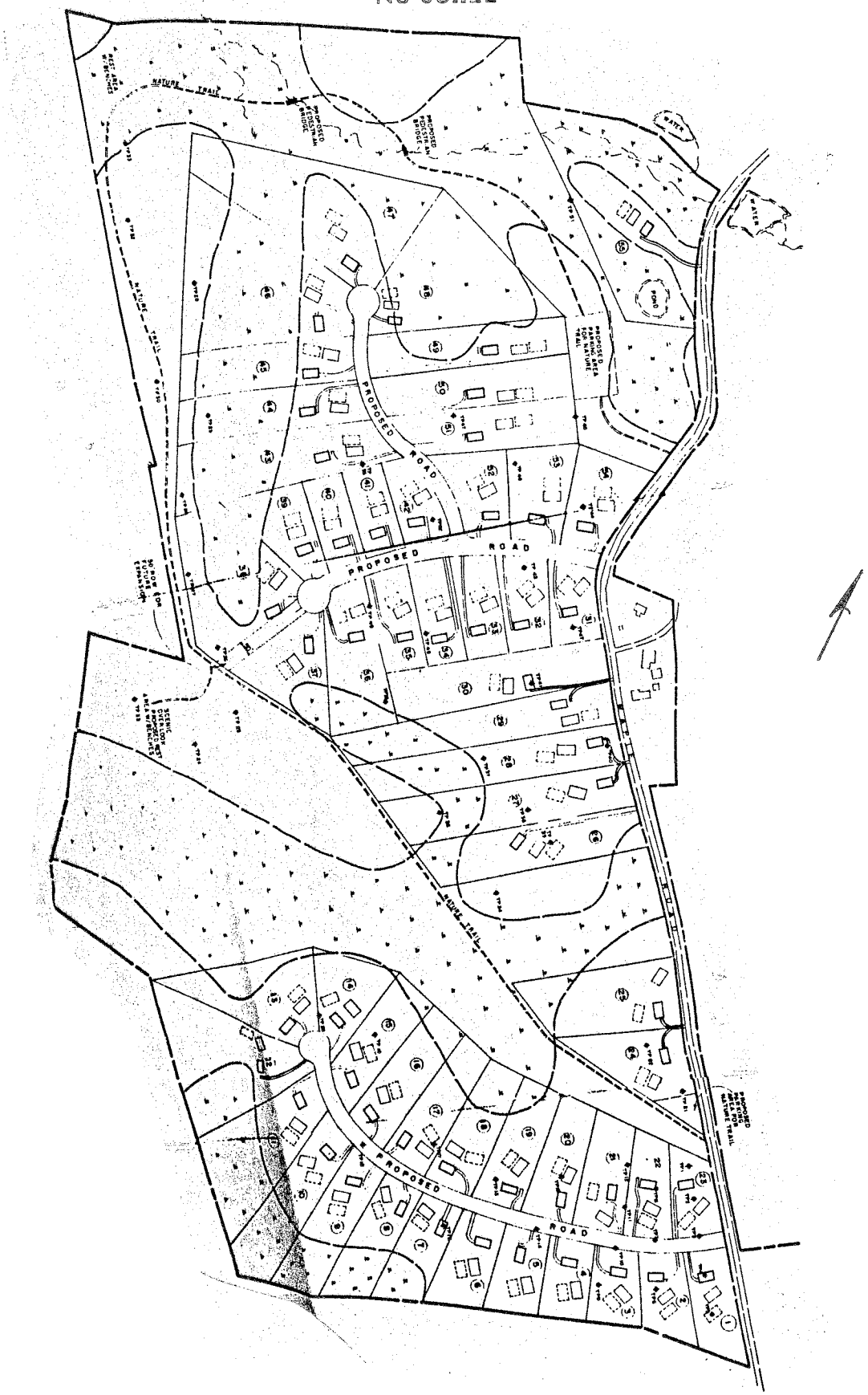
SCALE 1" = 2000'

APPROXIMATE SITE



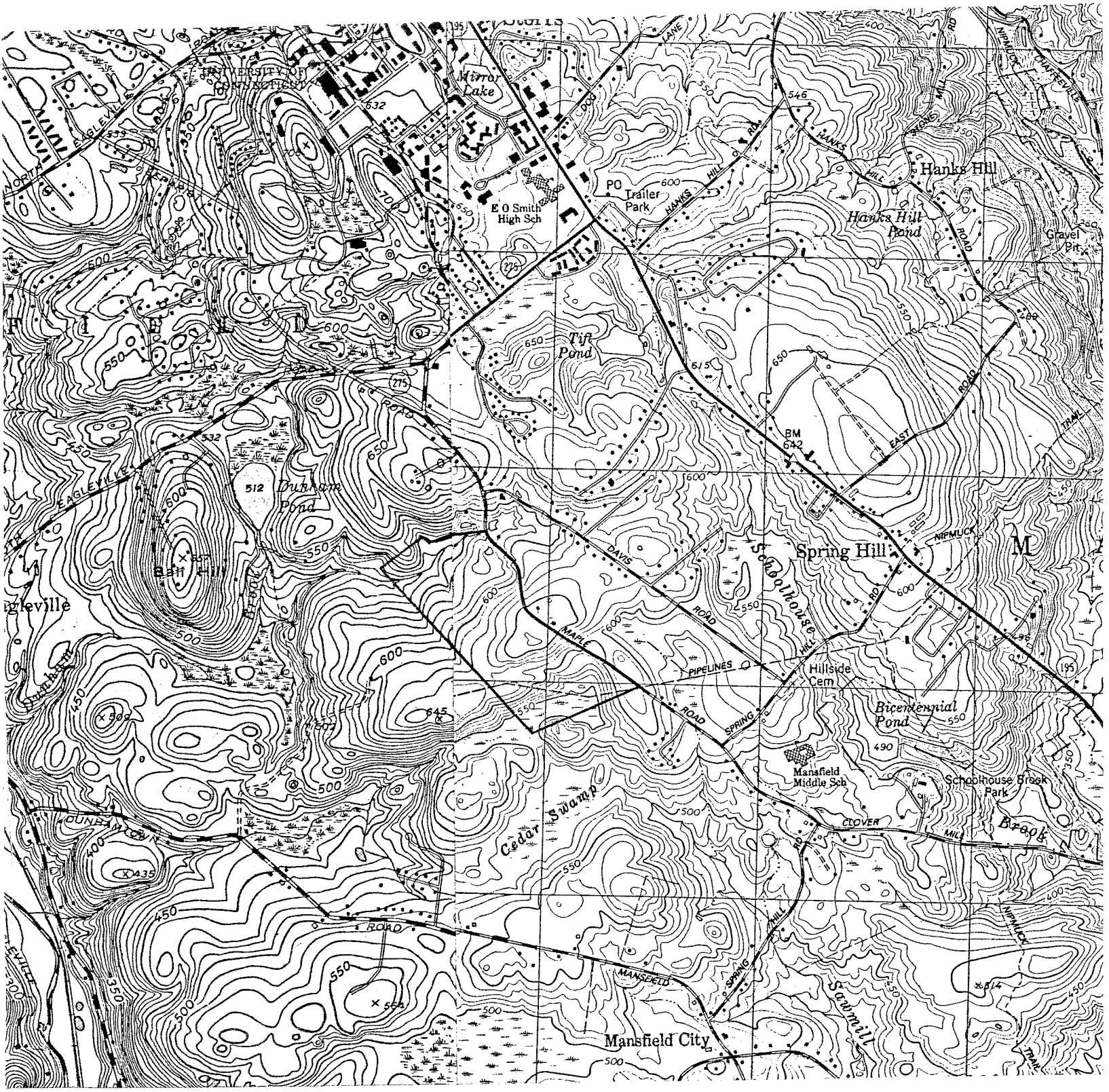
PRELIMINARY CONCEPT PLAN

NO SCALE



TOPOGRAPHY

SCALE 1" = 2000'

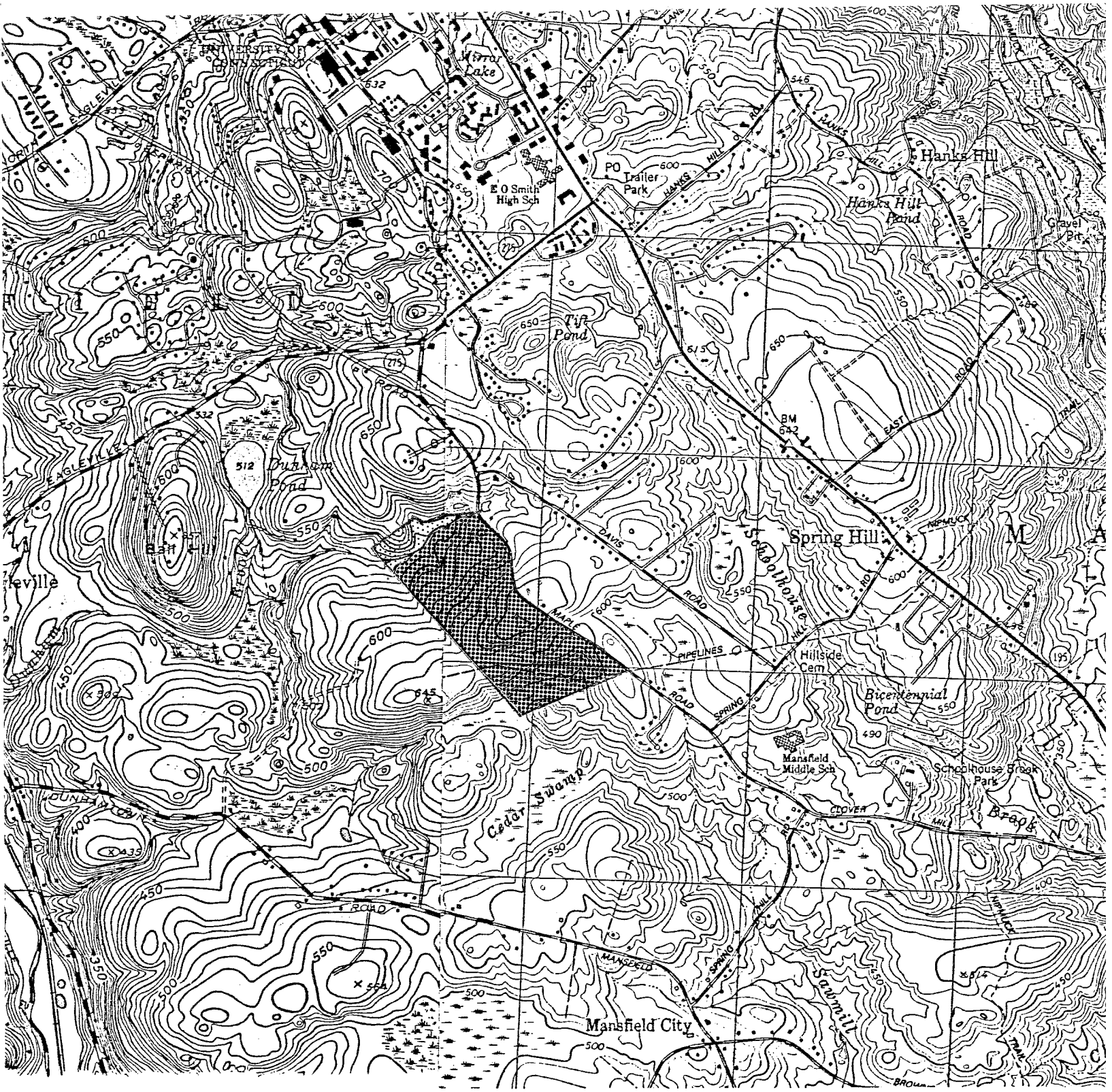


BEDROCK GEOLOGY

Hebron Gneiss

Tatnic Hill Formation

Scale 1" = 2000'



SURFICIAL GEOLOGY

Till

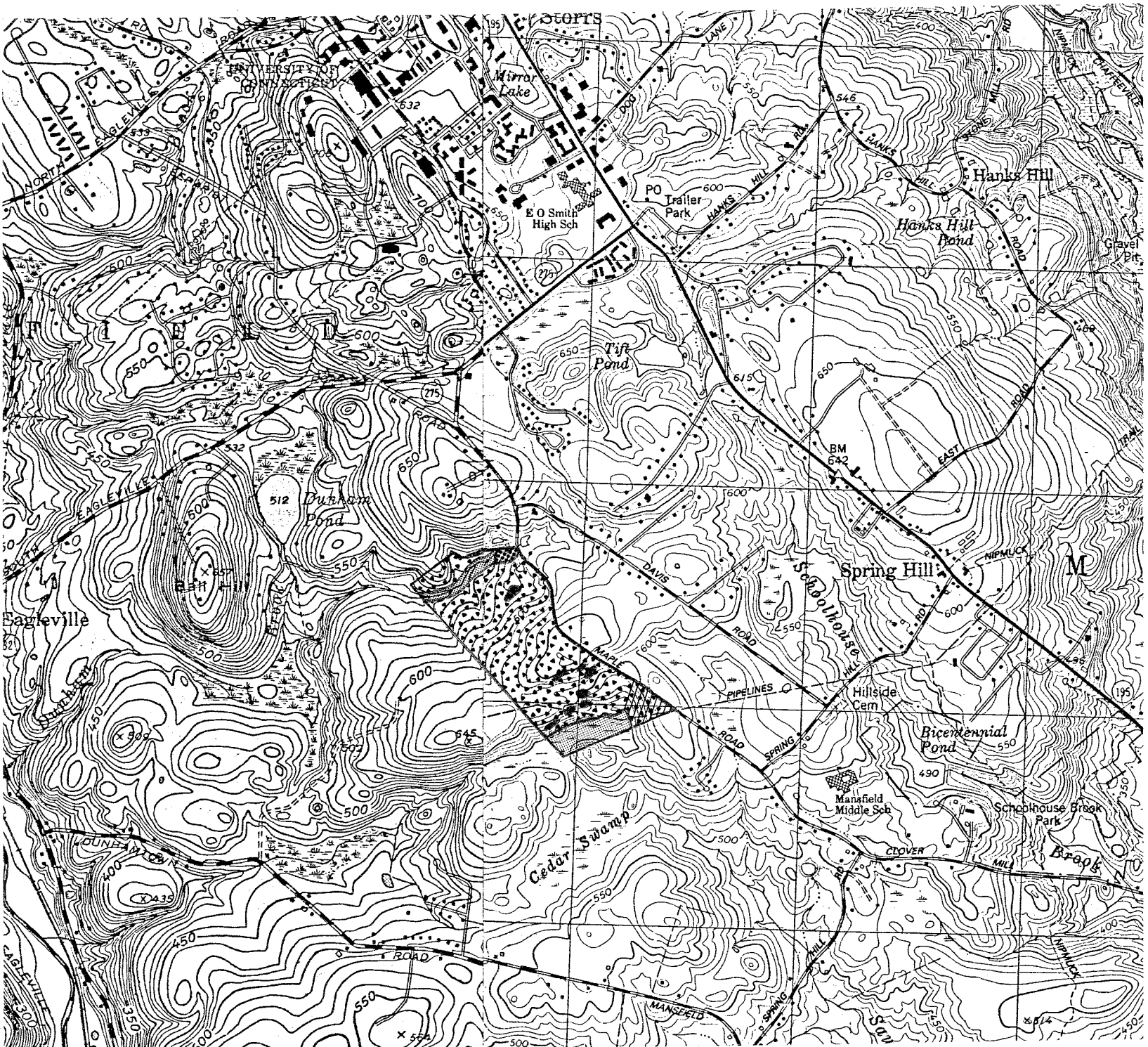
Thick Till

Stratified Drift

Wetland Areas (approximate)

Outcrops

Scale 1" = 2000'



SOILS

Tolland County USDA-SCS
24 Hyde Avenue
Rockville, CT 06066
875-3881

Scale 1" = 1320'

WATERSHED BOUNDARY

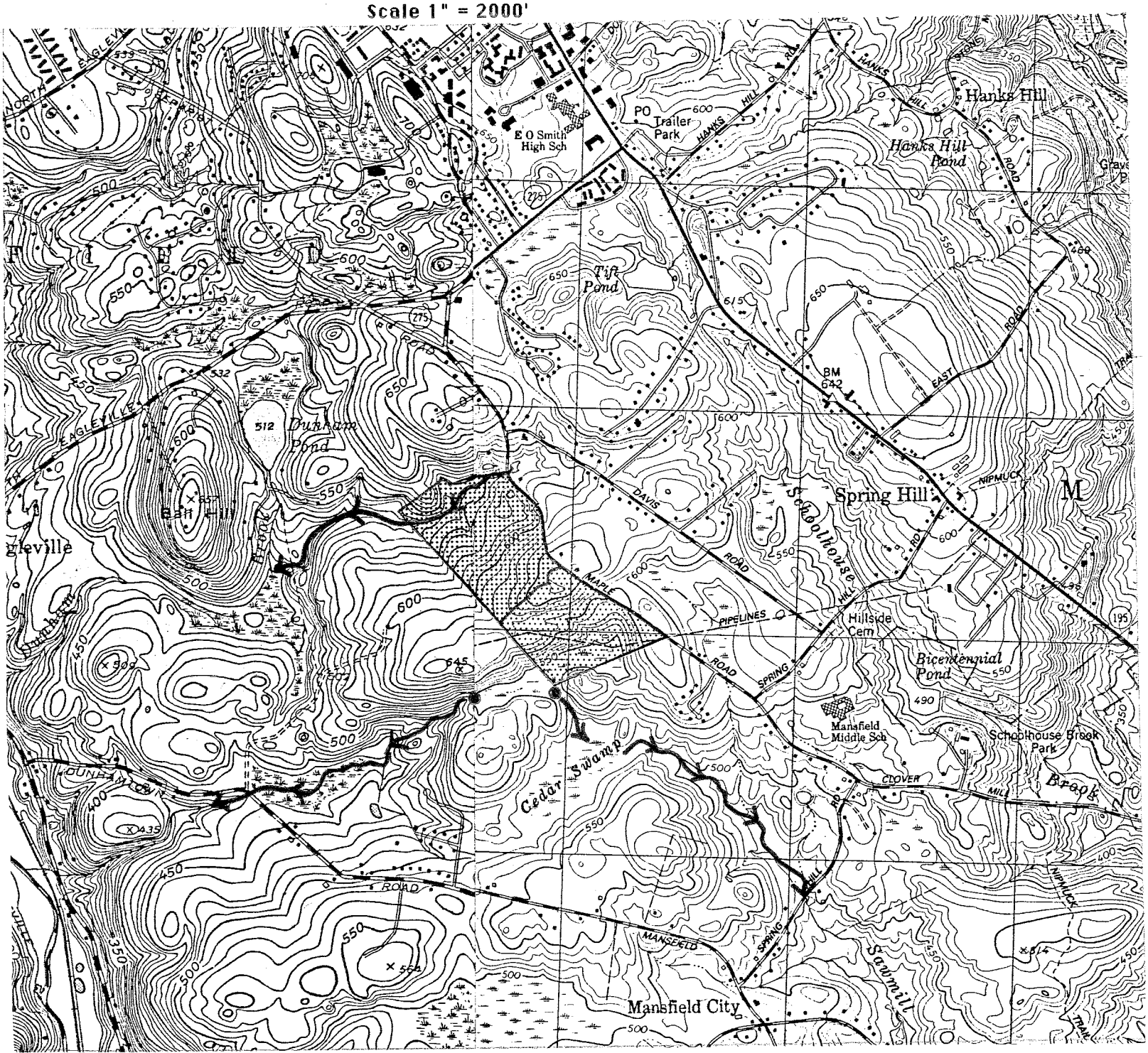
Portion of site that drains to Sawmill Brook

Portion of site that drains to the unnamed tributary to Dunham Pond Brook

Points of outflow for the wetland in the southern half of the site

Watercourses showing direction of flow

Scale 1" = 2000'



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 specialsits, 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: 203-345-3977, Eastern Connecticut RC&D Area, P.O. Box 70, Haddam, Connecticut 06438.