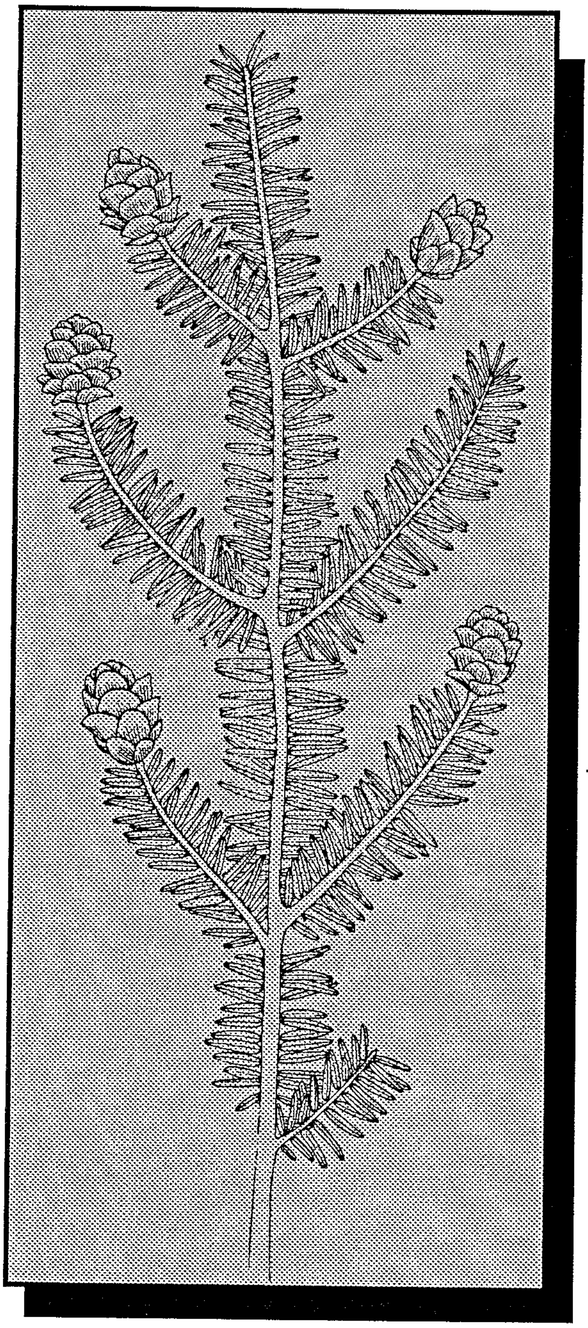
Pine Street School Site



Columbia, Connecticut

October 1990

EASTERN CONNECTICUT ENVIRONMENTAL REVIEW TEAM REPORT

EASTERN CONNECTICUT RESOURCE CONSERVATION & DEVELOPMENT AREA, INC.

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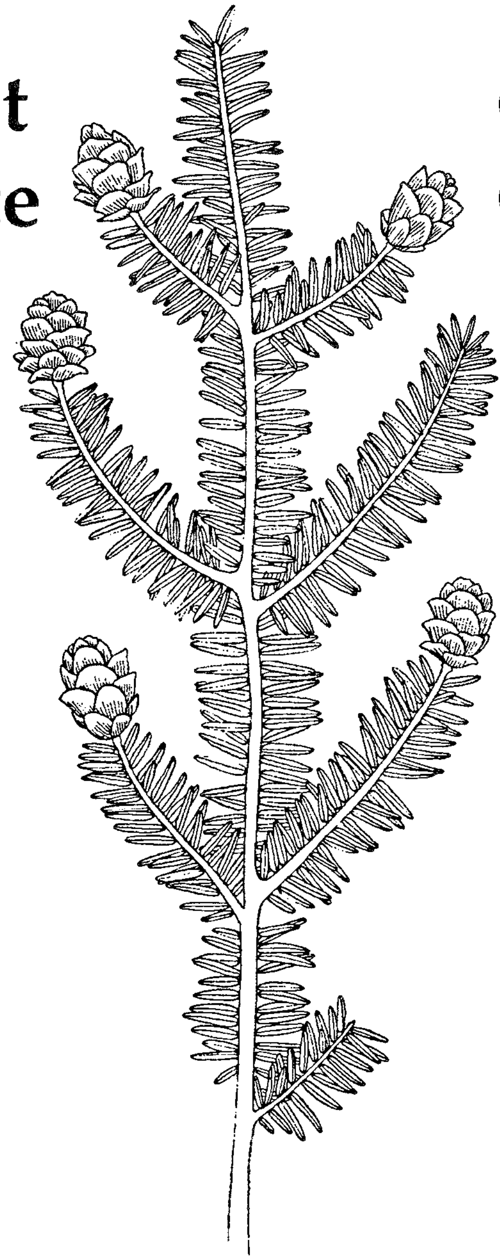
Columbia, Connecticut



Review Date:
August 30, 1990

Report Date:
October 1990

EASTERN CONNECTICUT ENVIRONMENTAL REVIEW TEAM

EASTERN CONNECTICUT
RESOURCE CONSERVATION & DEVELOPMENT AREA, INC.

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ENVIRONMENTAL REVIEW TEAM REPORT
ON

PINE STREET SCHOOL SITE
COLUMBIA, CONNECTICUT

This report is an outgrowth of a request from the Columbia First Selectman 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, August 30, 1990. Team members participating on this review included:

Barbara Buddington	*Regional Planner* *Windham Regional Planning Agency*
Dan Mayer	*Environmental Analyst* *DEP - Inland Water Resources Division*
Dawn McKay	*Zoologist* *DEP - Natural Diversity Data Base*
Brian Murphy	*Fisheries Biologist* *DEP - Eastern District Headquarters*
Jim Parda	*Forester* *DEP - Eastern District Headquarters*
Joyce Purcell	*District Conservationist* *USDA - Soil Conservation Service*
Elaine Sych	*Environmental Review Team Coordinator* *Eastern Connecticut RC&D Area, Inc.*
Bill Warzecha	*Geologist/Sanitarian* *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, and a soils map. During the field review the Team members were given preliminary plans and other information. The Team met with, and were accompanied by the First Selectman, a member of the Inland Wetlands Commission and the consulting engineer. 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 school site.

If you require additional information, please contact:

Elaine A. Sych
ERT Coordinator
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Haddam, Connecticut 06438
(203)345-3977

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1. LOCATION, ZONING, & LAND USE

The prospective middle school site, about 105 acres in size, is located in central Columbia. Via Connecticut Route 66 and Pine Street, the site is about 7,500 feet or just under 1.5 miles from Columbia Center. It is bounded on the east by Pine Street, from which the site is accessed, and on the north, west and south by wooded, undeveloped land. Active agricultural lands comprising open fields border the site to the north.

The site lies within a residential zone known as RA-2, which allows single family homes on 50,000 square foot lots (about 1.25 acres). It is understood that school buildings are allowed in the RA-2 zone, but only by special exception. Since public sewers and water mains are not available to the site, on-site wells and a central septic system will need to serve the prospective school facility.

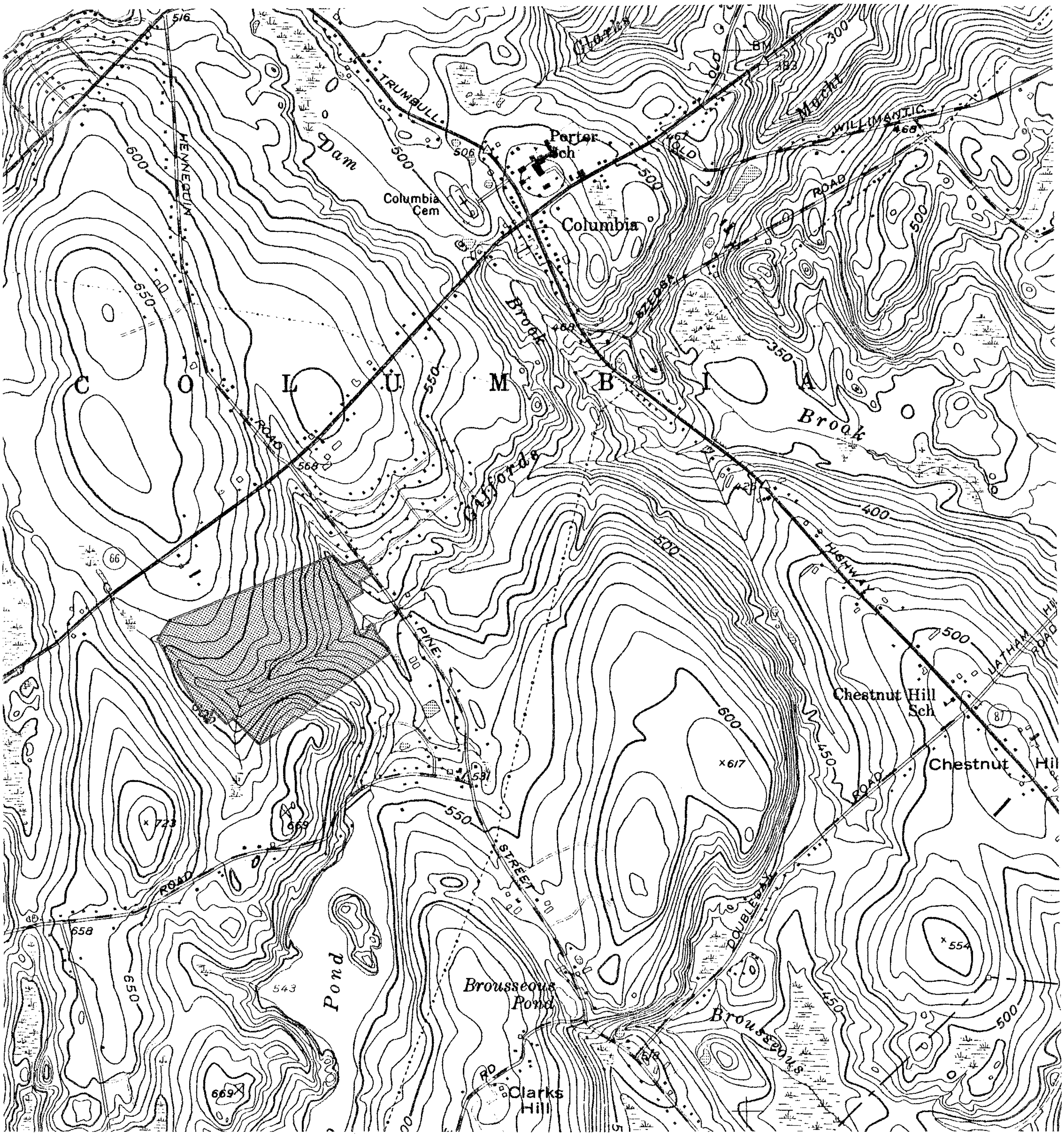
The site consists of both wooded and open land that is accessed by a unpaved road from Pine Street. Open land areas occur at the eastern and western limits of the site. The latter area has been extensively disturbed as a result of a land clearing and grading operation. This portion of the site retains features resulting from that operation which includes poorly drained depressions, stock piled areas of soil material and cut embankments. All of the work has disrupted the natural drainage in this area. A review of air photos for the site and vicinity indicates that this earth work was done after 1980. The open area in the eastern parts is cleared and unused.

Land use in the area consists mainly of residential and some agriculture. Pine Street and Brendi, Russman and Timber Trails which are east of the site serve mainly single family homes. A review of a 1934 air photo encompassing the site indicates that most of the northern half (north of the unnamed stream course on the parcel) was comprised of open farm fields. Comparing air photos for the site and vicinity over the past 56 years shows that there has been an increase in residential land use, a decrease in agricultural land and an increase in wooded land.

LOCATION MAP

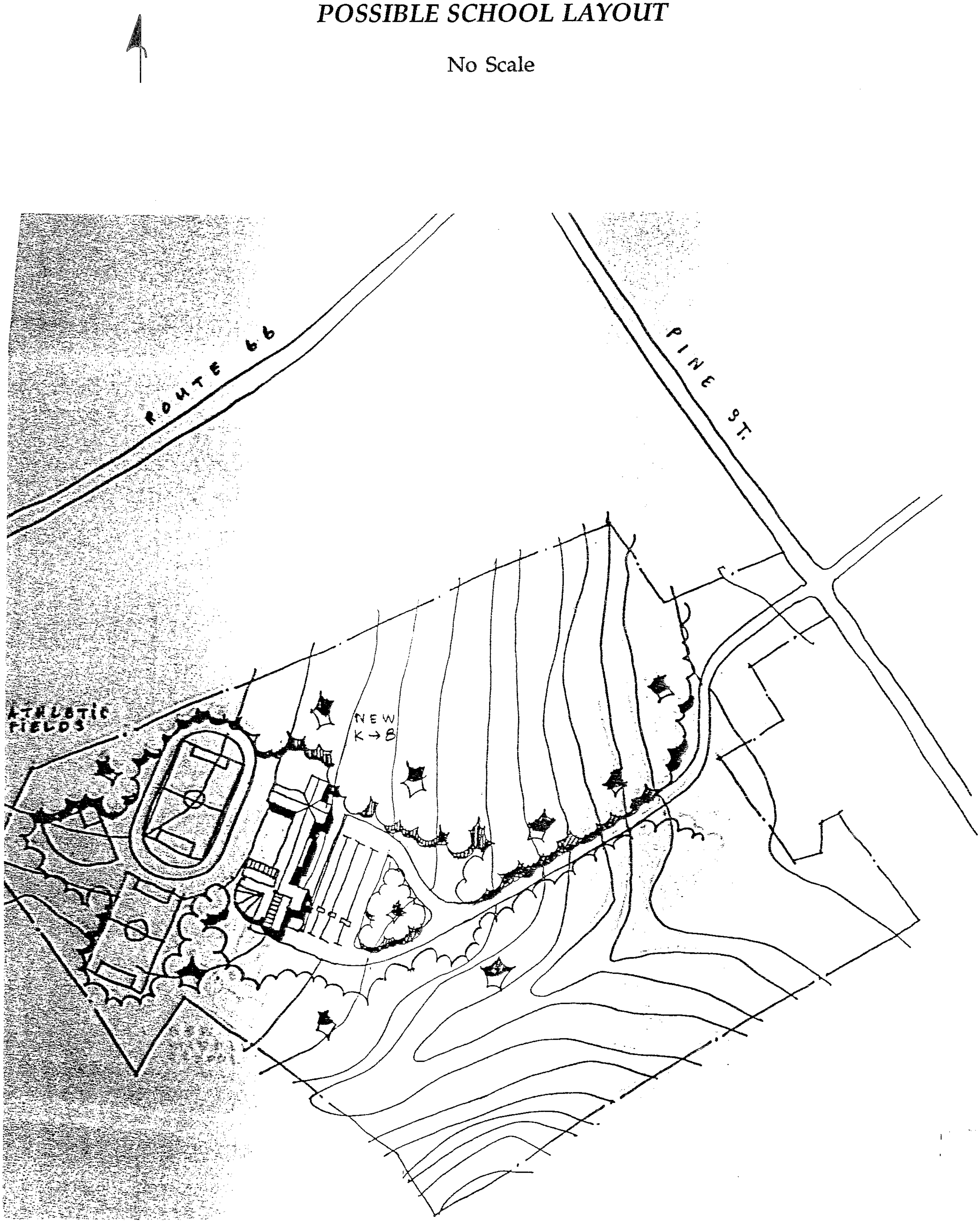
Scale 1" = 2000'

Approximate Site Boundary



POSSIBLE SCHOOL LAYOUT

No Scale



2. TOPOGRAPHY

The northern half of the site lies at the southern end of a drumlin hill whose crest includes the town owned athletic field complex off Hennequin Road. Topographic conditions on the site can be divided roughly into two areas. North of the unnamed streamcourse bisecting the central parts of the site, the land surface contains gentle and moderate slopes. South of the streamcourse, slopes are moderately steep and, in a few areas contains small areas of steep slopes. The greatest concentration of steep slopes on the site occur along the north side of a streamcourse bisecting the central parts. In places, the stream has eroded the land surface down to bedrock. Generally speaking, the land surface slopes to the four streamcourses that occur on or near the site.

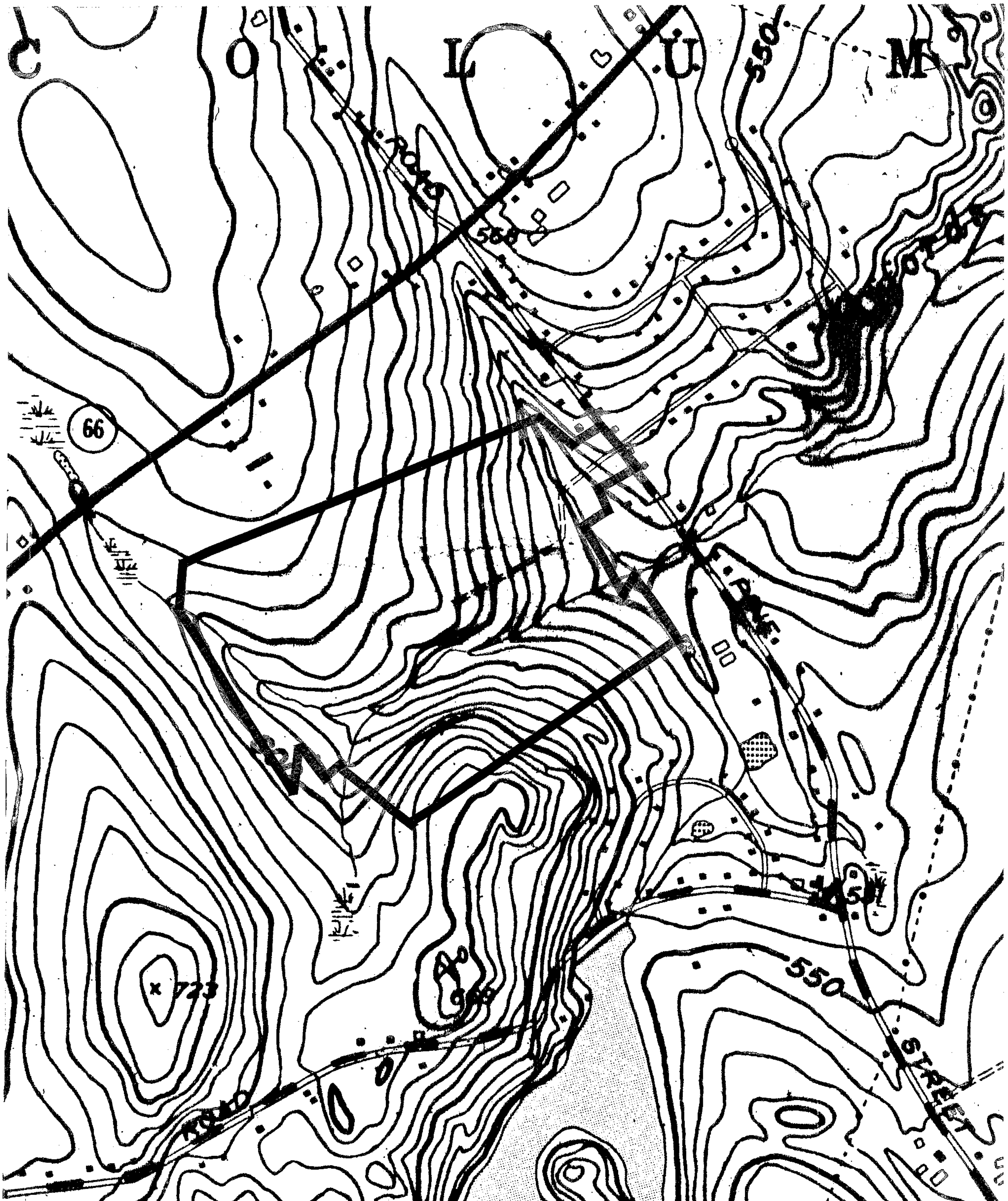
Maximum and minimum elevations on the site are about 645 feet above mean sea level and 500 feet above means sea level, respectively. The highest point occurs at the southern property line while the lowest occurs at the eastern limits (near the confluence of the four streamcourses mentioned in the preceding paragraph).

Although the existing gravel road runs generally perpendicular to the contours on the site, its grade is not overly steep. Based on visual observations made during the fieldwalk, it is probably 10% or less in most places along the route. Utilizing the existing unpaved road for access to the prospective school site area (northwest corner) has obvious benefits as it will reduce the amount of cuts and fills necessary to construct a new road, limits the amount of disturbance due to grading and minimizes wetland impacts. It is recommended that any construction be far removed from the steeply sloping areas that parallel the streamcourse bisecting the central parts. This will reduce the potential for sedimentation problems.

TOPOGRAPHIC MAP

Scale 1" = 1000'

Approximate Site Boundary



3. *GEOLOGY*

The site is located entirely in the Columbia topographic quandrangle. A bedrock geologic map (map GQ-592, by George L. Snyder, 1967) for the quadrangle has been published by the U.S. Geological Survey. Only preliminary information exists for the surficial geologic map at the present time. In addition, the Team's geologist referenced the Soil Survey - Tolland County Map of Connecticut and the unpublished Surficial Materials Map of Connecticut, 1985 by Janet Stone, et. al. for the surficial geology section of the report.

Map GQ-592, by George L. Snyder, identifies the principle rock type underlying the site as Canterbury Gneiss, a uniform, medium grained, gray to white gneiss composed of the minerals oligoclase, orthoclase, quartz and biotite. The term gneiss used in the preceding sentence refers to the structural and textural aspects of the rock. Gneisses are generally recognizable by banding which results from alternating layers of dark (biotite) and light colored minerals (quartz, oligoclase) .

Inclusions of pegmatite rock occurs in the Canterbury Gneiss and has been exposed in places by the streamcourse that bisects the central parts of the site. The pegmatite is described as a very coarse grained rock that is gray to white and is composed of the minerals oligoclase, microcline, quartz, and biotite.

The exact depth to the ledge rock surface on the site is unknown but it ranges from zero in outcrops areas along the streamcourse in the central parts to perhaps greater than 40 feet in the northwest corner of the site. Deep test holes excavated for subsurface sewage disposal on the site indicates that the bedrock surface was not encountered in any of the test holes, which ranged in depths between 7 feet and about 12 feet. A total of 31 deep test holes were excavated in the southern and central parts.

The bedrock aquifer is the principal source of domestic water to most homes in Columbia including homes on Pine Street, Brendi, Russmar and Timber Trails, and Hunt Road. Bedrock underlying the site would appear to be the principal aquifer serving the wells drilled for the prospective school site (see ***Water Supply*** Section).

The unconsolidated material overlying bedrock on the site is a glacial sediment called till. It was deposited directly from an ice sheet onto the bedrock surface with little or no working by glacial meltwater. Because the ice sheet indiscriminately collected and transported rock particles and fragments of widely ranging sizes as it advanced through the region, the till is a non-sorted mixture of sand, silt, gravel, clay and boulders. The texture of the till on the site is variable, ranging from sandy, somewhat stony and loose to silty, less stony and very compact. The silty, compact variety of till occurs primarily in the northwest corner of the site, where the land surface has been disturbed by land grading and soil excavation. Site plans distributed to Team members on the review day indicate that the school and athletic fields would be located in this area. The remaining parts of the site are generally characterized by sandy, somewhat stony and loose variety of till. An area of shallow till soils (HrC, HrE) occurs at the southern limits.

The compact variety of till mentioned in the preceding paragraph will be an important design constraint in terms of the construction of septic systems, school buildings with basements, parking lots and athletic fields due to a seasonally high ground water table condition. Because of its typically slowly permeable soil zone about 15" to 30" below ground surface, the downward movement of water is severely restricted resulting in a seasonally high water table condition. Unless it is properly addressed, the concern with this condition and septic system installation is that the seasonal high ground water table can rise up and hydraulically impair the functioning of the leaching field. Soil testing for on site sewage disposal by the town's sanitary engineering consultant has cautiously avoided this area for leaching fields due to the potential for a seasonal high water table condition. On the other hand, preliminary site plans indicate that the prospective school building, parking lots athletic fields would be located in this area. The installation of ground water intercepting drains and building footing drains will likely need to be installed so that buildings with basements, parking lot areas, and athletic fields are not adversely impacted by a high ground water table condition, especially during late winter and spring months. Site grading that utilizes grass swales may also be necessary for controlling surface runoff near buildings, athletic fields and parking lot areas. Topographic conditions on the site appear feasible for these types of structures.

Due to the shallow soil coverage in the southern parts excavations may encounter bedrock that requires blasting. However, present plans indicate that development will not occur in this area.

Based on the Soil Survey - Tolland County, Connecticut, the principal areas of regulated wetland soils generally parallel the streamcourses on the site and are estimated to comprise 25% of the site. A more detailed investigation of the site's wetlands by a certified soil scientist may result in some changes in the distribution and surface area of the wetlands shown by the soil survey. As such, the town should probably consider having the regulated wetland soils field checked by a certified soil scientist.

The Soil Survey identifies the most widespread wetland soil on the site as Lg soils (Leicester, Ridgebury and Whitman, very stony complex). This undifferentiated unit comprises very deep, loamy soils that formed in glacial till. The Ridgebury and Whitman soils develop in the compact glacial till while the Leicester soils develop in the more friable till. They range from poorly drained (Leicester and Ridgebury) to very poorly drained (Whitman). In general, the Leicester and Ridgebury soils are nearly level or gently sloping soils in drainageways and low lying positions of till covered uplands. The Whitman soils occur on nearly level to gently sloping depressions and drainageways on till covered uplands. From an engineering standpoint, the major concern of these soils focuses on a seasonally high water table (wetness). A high water table condition is at or near ground surface in the Leicester and Ridgebury soils generally between November and May. In the Whitman soils, a high water table conditions, at or above ground surface occurs September through June.

Other regulated wetland soils occurring on the site include a small area of Le soils (Leicester, stony, fine, sandy loam) which have already been described in the paragraph above and a pocket of Pk (peat and muck) soils in the northeast corner of the site. Theses soils consist of organic deposits derived from sedges, mosses, leaves, roots, woody vegetation, and other organic matter laid down in areas that are wet for most of the year. The depth of the deposits ranges from about 18 inches to 25 feet. The exact depth of the peats and mucks in the northeast corner is unknown.

The major limitations with the peat and muck soil from a development standpoint are;

1) A high water table that is at or near the surface most of the year.

2) The soils are prone to flooding or ponding.

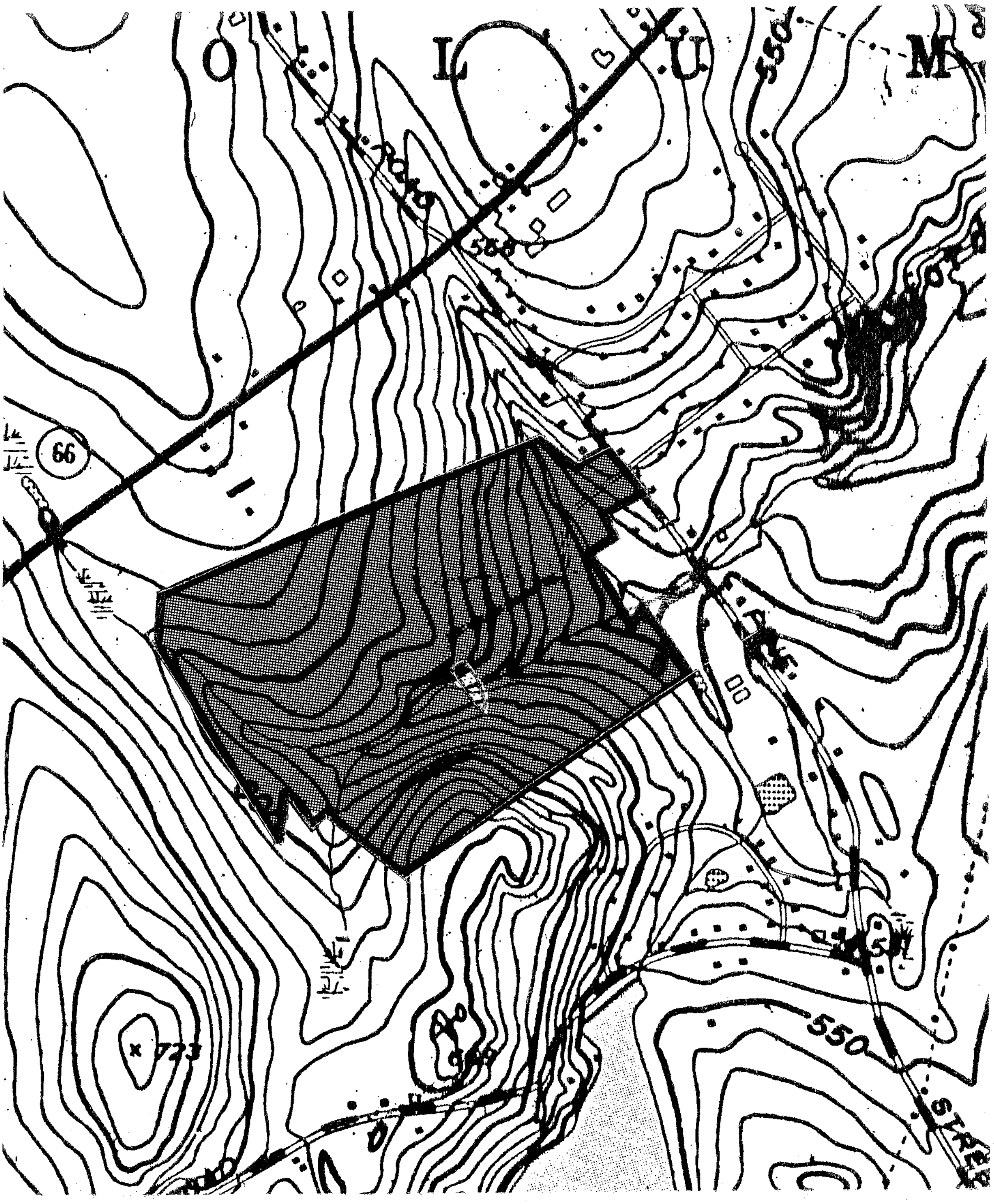
3) The soils are composed or organic layers that have low strength and stability.

For these reasons and others, no development should occur in this area. On the other hand, because of its ecologic, hydrologic and biologic importance and because of its proximity to the prospective school site, this area would have significance from environmental education and science research standpoint.

BEDROCK GEOLOGIC MAP

Scale 1" = 1000'

Canterbury Gneiss
Pegmatite
Outcrop

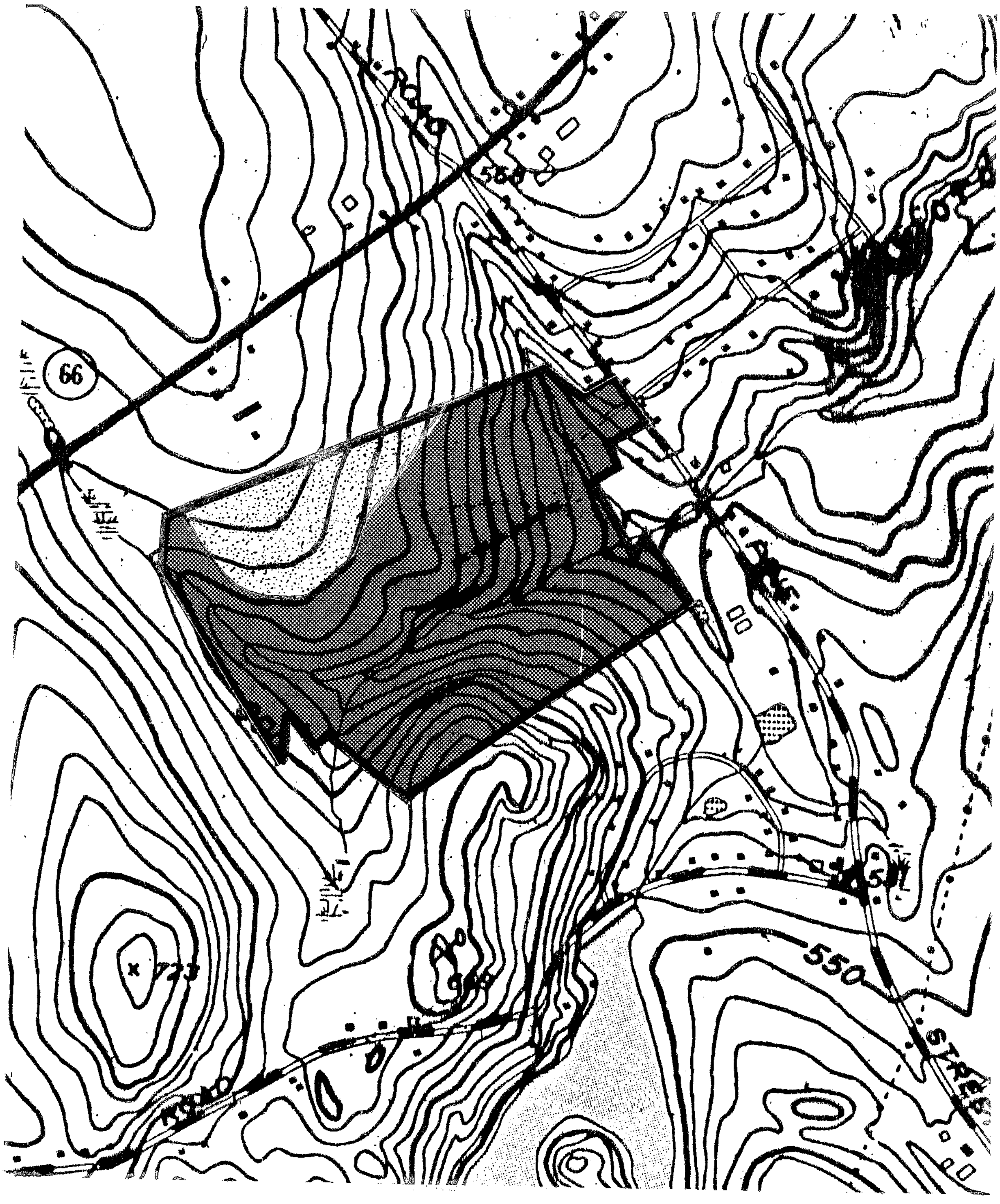


SURFICIAL GEOLOGIC MAP

Scale 1" = 1000'

Thick Till (Perhaps 40' or greater, generally characterized by a compact soil zone)

Till (10' or less)



4. SOILS

WETLAND BOUNDARY INFORMATION

The District suggests that the Commission require the applicant to provide for a review a plan map with the field delineated boundaries and station numbers shown. The soil scientist who performed the field work should then review and sign 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. 87-533. The boundaries of these soils and of the identified watercourses are accurately represented on the plot plan."

The Commission and/or appropriate staff should then arrange to meet with the applicant and the soil scientist to review these boundaries in the field and compare field conditions to the information submitted, especially in areas where alterations to the wetlands, road crossings, or stormwater discharges are proposed. Ask the soil scientist to explain any discrepancies between the SCS soil maps and the more detailed soil survey of the site. If this procedure is followed and discrepancies cannot be resolved, the Tolland County Soil and Water Conservation District can on request review the submitted information for adequacy and provide comments and/or on-site technical assistance.

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.

The Commission may also want to require the following (or similar) statements on the plan which relate to implementation and inspection of the soil erosion and sediment control plan:

1. "The contractor shall secure the services of a certified professional soil erosion and sediment control specialist or professional engineer who shall verify in the field that the controls required by this plan are properly installed, shall make inspection of such facilities not less frequently than weekly and within forty-eight (48) hours of any significant rainfall, and shall by written report, inform the owner or his agent not less frequently than weekly and the Town Planning and Zoning Commission not less frequently than monthly of observations, maintenance, and corrective activities undertaken. An approved checklist may be used to document the inspection findings."

2. "There shall be a pre-construction meeting with the Town soil erosion and sediment control agent, the Town wetlands agent, the contractor and the

contractor's professional soil erosion and sediment control specialist to discuss the plan and report requirements."

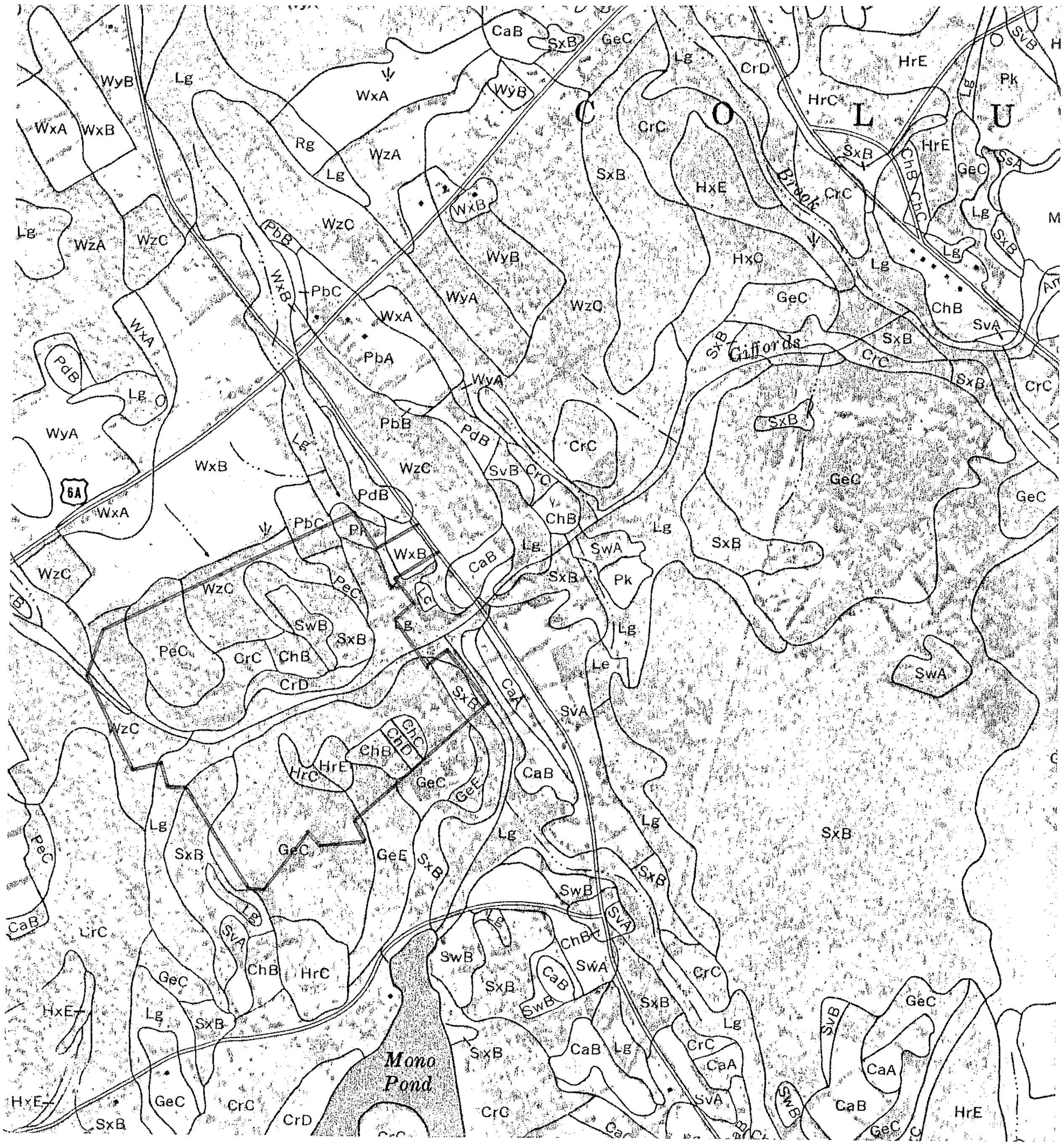
OTHER

The proposed road network disturbance limits, storm drain outlets, proposed stormwater discharges, and the proposed wetland culvert crossing over Gifford's Brook, need to be addressed specifically. Areas of concern for soil erosion include road cuts and embankments, stormdrain outlets, roadways with proposed grade of 8% or greater and the banks of receiving streams and watercourses. Adequate protection of receiving areas also need to be considered when planning a stormwater management system. Wetland areas and watercourses need to be protected from sediment damage. Sediment laden stormwater and sediment generated during road construction through or across wetland areas are primary concerns. Drainage associated with cuts to facilitate the building and associated athletic fields will need to be addressed, and the proposed drainage outletted in a safe stable area.

SOILS MAP

Scale 1" = 1320'

——— Approximate Site Boundary



5. HYDROLOGY

Four, unnamed perennial streamcourses occur on the site. Three of the four streamcourses converge at the eastern property line and there form the headwaters of Giffords Brook, a Ten Mile River tributary that flows in a east/northeast direction from the site. From the intersection of Pine Street and Giffords Brook, the streamcourse drains an area of about 1654 acres. The prospective school site is totally encompassed by this drainage area. The unnamed north flowing streamcourse that occurs at the eastern boundary is the outlet stream for Mono Pond. The remaining three watercourses originate in small wetland areas. Road drainage emanating form Route 66 to the north appears to contribute road runoff to two of the streamcourses.

Streamcourses on the site have not been classified by the DEP. Nevertheless, all are considered to be Class "A" water resources, by default, which means they maybe suitable for drinking, recreational or other uses. Additionally, these surface waters may be subject to absolute restrictions on the discharge of pollutants, although certain discharges may be allowed. The DEP classifies groundwater beneath the site as class GA, which means it is suitable for private drinking water supplies without treatment.

Development of the site for a school facility that includes large buildings, paved parking areas and athletic fields will lead to increases in the amount of runoff generated from the site. The potential impacts of increased runoff include downstream flooding and streambank erosion/surface water degradation. Considering the amount of land disturbance likely to occur on the site for the school and the amount of impervious surfaces created, surface drainage on and off site would be expected to change substantially following construction. As such, a detailed stormwater management plan that includes hydrologic calculations will need to be prepared and reviewed by appropriate town officials.

The overall goal of the stormwater management plan should be maintaining existing runoff patterns and maintaining post-development flows at pre-development flow levels so that flooding problems do not occur nor existing flooding problems, if they exist, not further aggravated in downstream areas. This can be accomplished by using control structures (detention basins) that will collect and hold stormwater generated by the school for slow release to downstream watercourses. The release rate should be designed not to exceed pre-development conditions for the various design storm events. Design of proposed detention basins should be in accordance with the Detention Basin (DB) Standard contained in Chapter 8 of the Connecticut Guidelines for Soil Erosion and Sediment Control (1985 as amended) and checked by the Town engineer. Every effort should be made to minimize potential adverse impacts to wetlands and watercourses in the study area. Detention basins and other stormwater control features should be located outside of wetland areas and streamcourses. Close examination of the culvert passing under Pine Street is warranted to ensure that post development flows can be adequately handled without causing flooding problems.

The stormwater management plan should also address the potential impact of streambank erosion and surface water degradation. Due to the moderate slopes, silty soils, and the anticipated amount of land disturbance the potential to degrade surface waters on-and off-site during and following development is high. A comprehensive E&S control plan for the school facility is needed to minimize potential environmental impacts to water and wetland resources. E&S control measures such as silt fences, haybales, anti-tracking devices and temporary/permanent off-line sediment ponds should be used to prevent transport of sediments or turbid water.

In order to achieve water quality goals, non-structural (protection of natural buffer areas, fertilizer management, street and parking lot sweeping) and structural (detention/retention facilities, infiltration devices, grassed swales, buffers) practices or combinations of practices should be used to prevent or reduce pollution inputs from stormwater runoff generated by the prospective school development.

WATERSHED BOUNDARY MAP

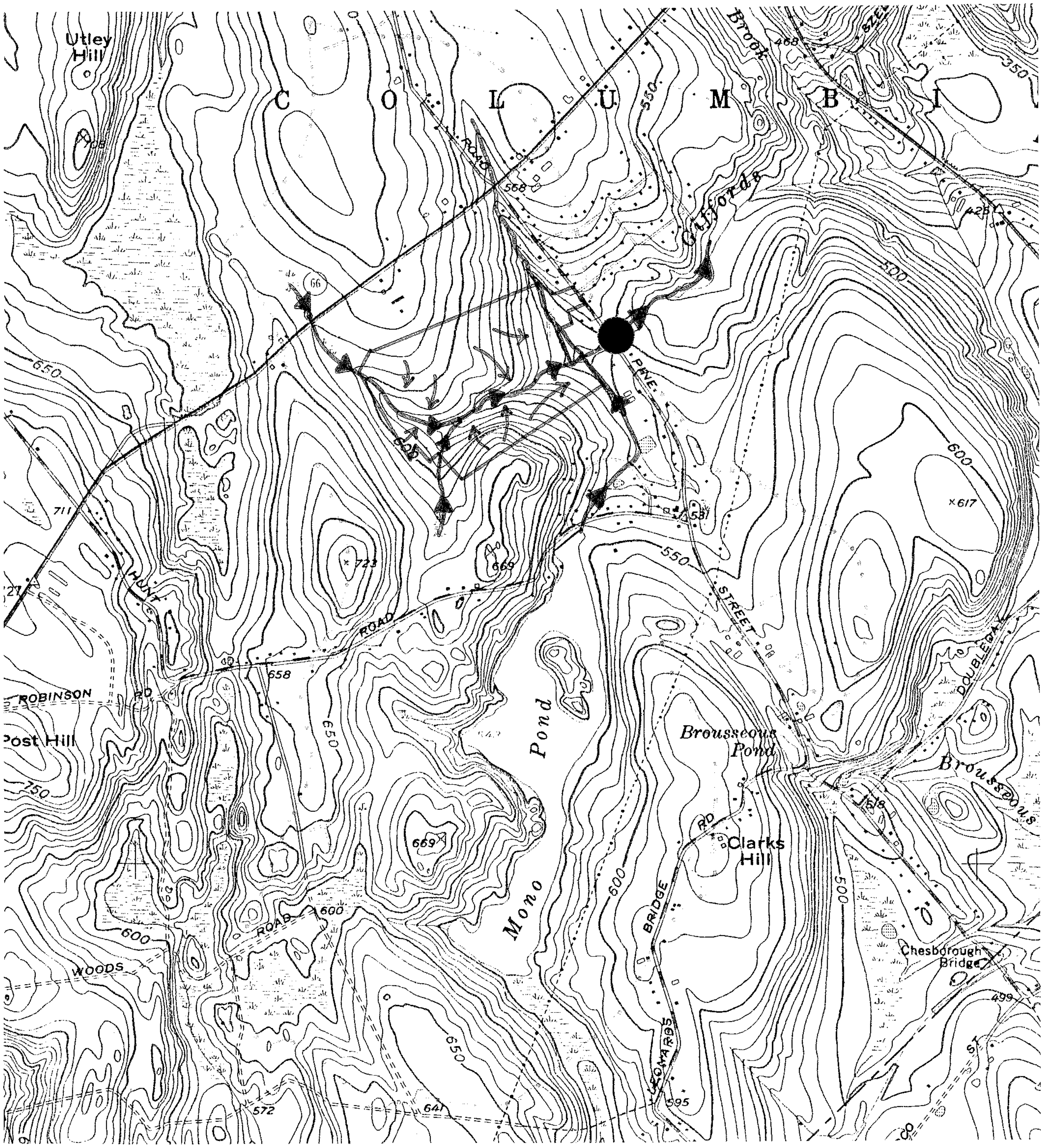
Scale 1" = 2000'

——— Approximate School Site Boundary

– – – Watershed Boundary and its repective design point from the intersection of Pine Street (at the culvert) and the unnamed E-W flowing streamcourse that bisects the site.

Surface drainage showing direction of flow

Watercourses showing direction of flow



6. WETLAND RESOURCE CONCERNS

SITE AND PROJECT DESCRIPTION

The site under review is a ±105 acre hillside site of hardwood forest, abandoned agricultural land and a watercourse corridor. The wetlands associated with the site are confined mainly to the areas adjacent to the watercourse which flows roughly from west to east through the lower third of the site. On the western portion of the site the watercourse splits, to the south and northwest, into two small headwater tributaries. Portions of the site have been cleared within the recent past for anticipated development which was never completed.

The proposed development would be a new elementary and middle school facility for grades K-8, including parking and recreational fields. The facility would have one main access off of Pine Street and be served by an on-site septic system and water wells. The overall slope of the site is moderate with relatively steep slopes occurring in areas adjacent to the watercourse corridor and on the areas to the south of the watercourse.

PROJECT IMPACTS AND RECOMMENDATIONS

The proposed development will have few direct impacts to the wetland and watercourse areas on the site. The access roadway and the school building will be constructed to the north of the main stream corridor. The recreational fields can be situated to the west of the school between the building and the small tributary. As shown on the preliminary plans only one roadway crossing of a watercourse will be necessary. This crossing is proposed to replace an existing farm crossing over an unnamed brook in the eastern portion of the site. The replacement of this already existing structure with one of better design and integrity is not seen as a significant impact to the watercourse.

A second crossing of the watercourse on the southern portion of the property will be made by the septic line to the reserve area of the septic system. This activity will result in a short term disturbance to the watercourse and some sedimentation, but if properly installed should not result in any significant adverse impacts to the system. Other potential impacts which would be expected with the development of this site include sedimentation of the watercourse during construction and long term discharges of stormwater from the site. However, measures can be taken to prevent or minimize impacts from erosion and stormwater runoff. If the project is properly designed and constructed no significant impacts should occur.

Based upon the inspection of the site and an overview of the potential impacts the following comments and recommendations are offered for consideration in evaluating proposed development of this site.

1) Stormwater generated from the site should be carefully managed. Development should take advantage of sheet flow and grassed swales whenever possible, provided that erosion problems are not created. If point

discharges are created care should be taken in design so as to prevent cutting of banks adjacent to the watercourse or other erosion problems. Stormwater generated from the access roadway could be carried by grass swales down to the brook in the eastern portion of the site. Discharges should not be proposed anywhere in the vicinity of the steep banks adjacent to the watercourse.

2) As is true with all developments sedimentation and erosion controls are very important in minimizing and eliminating many environmental impacts. The preliminary plans indicated that septic systems would be installed in the areas adjacent to the watercourse. The erosion and sedimentation plan should include a sequencing and maintenance schedule as well as regular inspections by a town land use official.

3) Lastly, the values of the wetlands and watercourse found on this site are good. Certain values such as education and recreation will increase as a result of the construction of a school. Overall the the resource is of good functional value and habitat quality.

7. WATER SUPPLY

Since there are no municipal water mains in Columbia, an on-site water supply well or wells will need to be developed to serve the prospective school facilities. The water supply would likely be provided by bedrock floored wells. Yields from bedrock wells depend upon the number and size of water-bearing fractures that are penetrated by the well or wells. Since the distribution of the fractures in the local bedrock is irregular, it is difficult to predict what the yield of a well or wells drilled on the site might be without drilling the well(s) first. Nevertheless, according to Water Resources Bulletin #11 (Shetucket River basin) which includes the prospective school site, 90 percent of the bedrock wells surveyed for report yielded at least 3 gallons per minute (gpm) or 4,320 gallons per day. More locally, the Team's geologist surveyed well completion reports for 36 bedrock wells serving homes on Hunt Road, all of which appear to tap Canterbury Gneiss and which reported yields that ranged from .25 gpm to 35 gpm. Well depths advanced into the underlying bedrock from 100 feet to 705 feet below ground level. The average yield of the domestic wells surveyed was computed to be about 5 gallons per minute or 7,200 gallons per day. Hunt Road is located south of the property and is about 2 miles long.

It should be noted that there is a community water supply system, called Columbia Heights which serves homes on Yeoman Road and Hunt Road just south of the site. The water supply well which is 222 feet deep taps the underlying bedrock (Canterbury Gneiss). It is a 6" drilled well reported by its owner to yield 22 gallons per minute and currently serves about 88 people.

In order to determine whether or not the yield of potential bedrock well(s) drilled on the site would be sufficient for the school, the town's engineer or architect/consultant for the project will need to determine water demand. This figure depends on the student population, the number of sanitary facilities provided, whether or not gymnasium with showers is constructed, and cafeteria facilities as well as other factors. Water usage should probably be metered at the town's existing school or town officials should survey water usage rates for similar sized schools in neighboring towns.

No figures on student body populations were given to Team members on the review day so that water use at the school site could not be estimated. Nevertheless, if one assumes a water consumption at 20 gallons per student (a ballpark figure used for sizing a septic system for a school with a cafeteria and gymnasium with showers) and a student population of 320, the projected water demand for the school would be about 6,400 gallons per day. Based on an 18-hour pumping period, a well yielding about 6 gallons per minute would be necessary. The latter figure is only an estimate and should not be used for design purposes. Considering the average yield of the wells serving homes on Hunt Road and the yield reported for the Columbia Heights water supply well, the bedrock aquifer in the area appears capable of yielding an adequate amount of water for the prospective school but, as indicated earlier, this can only be determined by drilling the well first. There is always a chance that more than one well will be required.

Ample precaution should be taken to keep the well or wells safe from septic system contamination, fuel oil tanks, roof drainage and surface drainage. Such precautions would include placement of wells uphill from septic system leaching fields, surface and roof drains, and conservative separating distances maintained. Consideration should be given not to locate fuel tanks below ground on the site.

The well or wells serving the prospective school will need to be approved by the State Department of Health Services (Public Water Supply Section) and the local health department. Information on projected needs of the prospective school in terms of water quantity, water quality testing and plans for pumpage, storage, treatment, if necessary, and the distribution system would also be required for a water supply serving a school.

In terms of natural quality, the water beneath the site should be fairly good with the possible exception of elevated radon levels, which has occurred in the Canterbury Gneiss in other parts of eastern Connecticut. Studies have demonstrated that geology is a predictor of water radon.

In a survey conducted by the U.S. Geological Survey (U.S.G.S.) the Department of Environmental Protection (DEP), and the Department of Health Services (DOHS) between 1986-1989, 8 bedrock wells that tap Canterbury Gneiss were analyzed and found to have radon levels that ranged between 10,000 picocuries/liter and 64,500 picocuries /liter (the unit used to measure radon levels in water) with an arithmetic mean of 30,000 picocuries/liter. It should be noted that these samples were not taken from wells that tap the Canterbury Gneiss underlying Columbia but other areas it underlies in eastern Connecticut. Nevertheless, because of the elevated radon levels found in the 8 wells tested, the Team's geologist is concerned that similar levels may occur in bedrock well(s) drilled on the site.

Although no state or federal standards exist to date for well water radon, an action level of 4 picocuries/liter for indoor air radon has been set by the U.S. Environmental Protection Agency (EPA). The State Department of Health Services indicates that as much as 18% of indoor air radon concentration can be attributed from bedrock wells elevated with radon.

The levels found in the 8 wells mentioned earlier are elevated enough to be considered potentially hazardous and would likely require mitigation measures such as aeration. Treatment of the water by aeration is known to be effective for the removal or reduction of radon in drinking water supplies.

It is understood that the Office of Drinking Water, a branch of the U.S. Environmental Protection Agency which regulates drinking water standards for public water supplies (the prospective school would meet the definition of a public water supply) are expected to release a maximum contaminant level for radon in drinking water in late fall/early winter. New Connecticut legislation requires the State DOHS to recommend a maximum acceptable level for radon in indoor air and water supplies of schools. This information will likely be released shortly after January 1, 1991.

Early indications are that the action level to be set by EPA for well water radon will range between 200 picocuries/liter and 2,000 picocuries/ liter. As indicated earlier, all of the 8 wells sampled in the Canterbury Gneiss were found to have water radon levels significantly above 2,000 picocuries/liter. As such, all wells would require mitigation for the reduction or removal of radon under the expected guidelines.

As part of the approval process of the prospective school's water supply, water testing which includes gross alpha screening for radioactive substances in the water would be required. If the water withdrawn from bedrock well(s) drilled on the prospective school site fails the gross alpha screen, there is a good chance that the radon level in the well water will be 5,000 picocuries/liter or greater and, as such would exceed the expected action level forthcoming by the Office of Drinking Water.

8. SEWAGE DISPOSAL

Since the town is not presently served by municipal sewers, the prospective school would need to be served by an on-site septic system. As such, areas of suitable soil must be located for a subsurface sewage disposal system and a 100% reserve area that meet all necessary state and local requirements. Ideally, the leaching areas should not be located under paved parking or other areas that receive heavy traffic usage, as this can cause problems to the system.

Subsurface exploration for septic system suitability has been conducted by the town's sanitary engineering consultant. To date, this work has included the excavation of 31 deep test holes, 18 permeability tests run on soil samples collected in the potential leaching field areas and monitoring of ground water levels in seven areas. Deep test holes were excavated north and south of the unnamed streamcourse that bisects the central parts of the site. A review of the deep test hole data indicates that surface conditions were found to be generally favorable for on-site sewage by disposal particularly in a ±2 acre area on the north side of the streamcourse. The area was characterized by gentle slopes, no shallow to bedrock conditions, satisfactory soil permeability rates and groundwater table conditions that are not too elevated. The steeply sloping areas and wetlands that parallel the streamcourse in the central parts should be avoided with respect to the construction of leaching disposal systems. Subsurface condition south of the streamcourse also appear favorable for on site sewage disposal but because of topographic conditions pumping of the septic tank effluent will be required if this area is utilized for a leaching field.

The sewage disposal system serving the prospective school will probably qualify as a community "public" subsurface sewage disposal system, and the Department of Environmental Protection's Land Disposal Section of the Water Compliance Unit would need to issue a permit for the system.

Through detailed soil testing, the Town through their sanitary engineering consultant must show to the DEP that the site's soils can adequately treat and disperse sewage effluent at the proposed volumes without adversely impacting surface and groundwater in the area. Therefore, the hydraulic capacity of the soils will need to be determined for the final disposal site. This information, taking into account certain parameters, will be used in making an evaluation of the site's capabilities for handling the design flows of the project. It is understood that the sanitary engineering consultant for the school project is working closely with the DEP Land Disposal Section relative to septic system feasibility for the site.

9. THE NATURAL DIVERSITY DATA BASE

The Natural Diversity Data Base maps and files have been reviewed regarding the "Pine Street Middle School Site", Columbia, Connecticut. According to the information there are no known extant populations of Connecticut "Species of Special Concern" or Federal Endangered and Threatened 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 Natural Resources Center's Geological and Natural History Survey and cooperating units of DEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultation 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.

Please contact the Natural Diversity Data Base if you have further questions (566-3540).

10. VEGETATION TYPE DESCRIPTIONS

<u>Type 1</u>: **Mixed hardwood, 20 acres.** Composed of primarily sawtimber sized trees (11 inch diameter trees and larger measured at 4 1/2' above ground) including red maple, red oak, black oak, white oak, hickory, yellow birch, white ash, black cherry, sugar maple, and tulip. The understory vegetation is spicebush, barberry and fern. Approximately 30% of the sawtimber sized trees have died in the past 5 years. Of the remaining sawtimber trees 80% have defects such as heartrot, seams and butt cracks.

<u>Type 2</u>: **Mixed hardwood, 7 acres.** Composed of poletimber (5 inch thru 11 inch diameter trees measured at 4 1/2' above ground) and sawtimber trees including red maple, white ash, black cherry, hickory and sassafras. Several trees are experiencing crown dieback indicating a decline in health and vigor in the stand. The understory is dense mixed hardwood seedlings that have grown since a harvest in the early 1980's. Several large culls are present on site.

<u>Type 3</u>: **Old field clearing, 12 acres.** Early successional stage vegetation ranging from bare ground and grasses to some seedling hardwood trees. vegetation on site includes blackberry, dewberry, grape, autumn olive, golden rod and numerous wildflowers, multi-flora rose, aspen, birches and sassafras.

<u>Type 4</u>: **Mixed hardwood, 9 acres.** A sapling stand 95% red maple with scattered poletimber, ash, oak and birch. Occasional sawtimber sized trees occur along the stonewall. Widespread patches of juniper on the forest floor indicate that once this area was a pasture.

<u>Type 5</u>: **Northern hardwoods, 18 acres.** Composed of sugar maple, yellow birch, beech, white ash, hickory, red maple, black birch and some oak. This poletimber - sawtimber stand parallels the stream on the property acting as an excellent buffer zone. The understory is spicebush, blueberry, azalea and fern.

<u>Type 6</u>: **Mixed hardwoods, 14 acres.** Poletimber sized oaks, hickory, maples and birches. The moderately dense understory is fern, spicebush, azalea and blueberry. The stand appears generally healthy, but crowded with too many trees. Black birches are diseased, but most other trees have the potential for good growth.

<u>Type 7</u>: **Mixed hardwood, 18 acres.** Seedling sapling oak, ash, maple and birch that has grown since a harvest in the early 1980's.

<u>Type 8</u>: **Bottomland hardwoods, 7 acres.** Composed of red maple, elm, cottonwood and willow. Understory vegetation includes blueberry, grape, witch hazel, dogwood and speckled alder. Trees vary in size and age in this stand. Some open areas along fields have very dense shrub growth.

Trees are very sensitive to the condition of the soil within the entire area of their root systems. Construction practices involving excavation, filling and grading for road building and structures, and soil compaction from heavy equipment disturbs the balance between soil aeration, soil moisture level and soil composition. Disturbances to soil near trees can cause a decline in tree health and vigor resulting in mortality in three to five areas for root fungi which can also kill a tree in a short time. Trees with cut root systems do not have proper soil holding capacity, windfirmness or water-nutrient absorption ability. This also results in reduced health and vigor and opens the tree for insect and/or disease infestation. Mechanical injury can lead to hollow trees which are structurally unsafe around people. The negative effects of construction on trees is not usually visible at the time the work is done. However, soil compaction, root injury, and scraped bark contribute to insects and disease infesting the tree after machinery has left the site. This creates hazards and problems as trees die several years after construction. These problems can be minimized or eliminated with proper care taken with vegetation during development. No excavation , filling or soil removal should occur within 50 feet of any trees along the edge of land cleared for the school and surrounding grounds.

When highly absorptive forest soils are disturbed (grades on hills cut and filled to create roads, driveways, lawns and houselots) the overland flow of water increases because the sponge-like effect if the litter and humus layer is lost. The resulting soil compaction prevents rain from soaking into the soil surface as it falls. This causes water to collect and run over the lawns and roads. The runoff has the potential to build erosive power in short distances, tear soil loose and result in sedimentation and siltation. The greatest impact on water quality from loss of absorptive forest soils is during, or just after, construction. The increased erosion can cause sediment accumulation in streams, ponds or reservoirs, destruction of aquatic wildlife habitat by siltation and reduction of water quality from turbidity. Forested areas contribute little sediment to streamflow. Converting a forest environment to an urban one could affect water relations drastically. Peak flows may increase as well as sedimentation. One set of estimates has shown run off increasing by 15, 29, and 41 percent by paving 25, 50, and 75 percent of a forested watershed. This is because urbanization reduces interception of rain, infiltration, soil moisture storage, and evapotranspiration, and increased land flow and run off. Forestland is also beneficial in protecting water quality by minimizing eutrophying nutrients such as phosphorus, and soil-borne contaminants. Phosphorous is generally the limiting nutrient for aquatic ecosystems and usually tightly held by forest ecosystems. However, on-site sewage disposal generates large quantities of phosphorous, which can enter aquatic systems and accelerate eutrophication. Phosphorous export from forested land is estimated to be one-seventeenth that of urban land. No tree removal is recommended in vegetation **Types 5** and **8** on this property to minimize impact from on-site sewage disposal.

Trees grown in a crowded forest environment rely on each other for stability and side support. Opening from roads and buildings which allow wind to pass through them will result in broken off or uprooted trees. This can occur with single trees in open lots and along newly cut roads. Trees growing on northeast and -southeast slopes and those in hardpan soils with seasonally high water tables are the greatest liability. Stands 1, 2, and 8 are the most susceptible. Also contributing to windthrow is construction equipment which cuts roots systems and thereby reduces the tree's own capacity to support itself. Machinery should not get closer than 25 feet from the base of the trees along road edges and not closer than 50 feet along lot edges.

Due to the high value of trees today proper forest management is essential before, during and after construction. A forester views a proposed development as a group of plant communities. Each of these communities (commonly called a "stand") have developed to accommodate the existing environmental restrictions of light, soil, moisture and nutrients. Each plant community will react differently to changes caused by construction. A professional forester is essential in evaluating tree health and vigor, insect and disease problems, species longevity, potential mortality, management of open space for recreational opportunities and wildlife habitat. Management recommendations are not only based on present tree condition, but also on expected future conditions of the trees in 10, 20, or 30 years. A pre-development thinning in stands 1, 2, and 6 could serve to strengthen trees in these areas against breakage and wind throw while raising revenue. A forester should be involved in the overall development plan to advise on individual tree retention, tree island retention, erosion and sedimentation control and site limitations which can create future hazards.

ENVIRONMENTAL CONSIDERATIONS

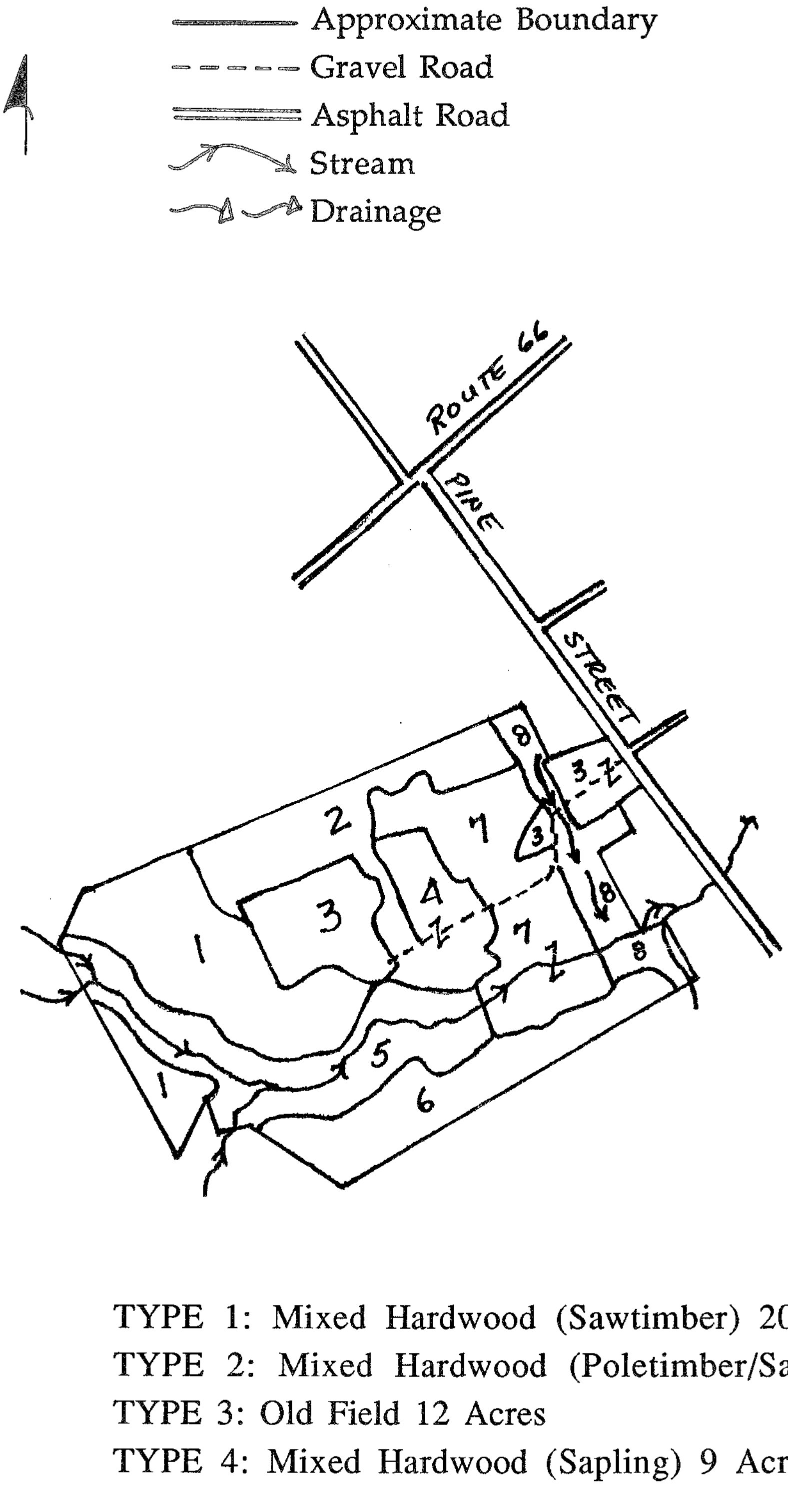
The techniques outlined in this review can reduce erosion problems, help control storm water, save valuable vegetation and utilize certain timber resources. Woodlands provide a protective influence on soil stability and water quality. The forest also provides habitat for a variety of wildlife from amphibians and reptiles to small mammals, a variety of birds, predators and larger mammals. They depend on woodland for food, water, shelter and breeding habitat. Trees also have a positive influence on air quality as they convert carbon dioxide to oxygen and act as terrestrial sinks (collectors) to reduce airborne particulate and gaseous pollutants. Forests also provide a cool ecosystem from shade that is absent in open areas.

CONCLUSION

Trees have value in reducing climatic extremes, controlling runoff, filtering out polluting particles from air and water, reducing noise, providing aesthetic enjoyment, creating wildlife habitat, recharging aquifers, supplying wood fiber and functioning as a carbon sink. Healthy vegetation provides the long term amenities. Therefore a good relationship between urban growth and forest lands must exist. Trees around buildings can be healthy, long lived and valuable if treated properly in the conversion from forested habitat to subdivision. What is lost due to development is the wildlife carrying capacity of the forest and its ability to produce wood fiber for generations in the next century and beyond.

VEGETATION TYPE MAP

Scale 1" = 1000'



TYPE 1: Mixed Hardwood (Sawtimber) 20 Acres
TYPE 2: Mixed Hardwood (Poletimber/Sawtimber) 7 Acres
TYPE 3: Old Field 12 Acres
TYPE 4: Mixed Hardwood (Sapling) 9 Acres
TYPE 5: Northern Hardwood (Poletimber) 18 Acres
TYPE 6: Mixed Hardwood (Poletimber) 14 Acres
TYPE 7: Mixed Hardwood (Seedling/Sapling) 18 Acres
TYPE 8: Bottomland Hardwood 7 Acres

11. FISH RESOURCES

SITE DESCRIPTION

The headwaters of Giffords Brook originate within the 105 acre parcel. One of the primary functions of headwater stream reaches and its associated wetlands is to provide clean and unpolluted waters to downstream areas of the watershed. Therefore, it is extremely important that any development that occurs on this parcel will not directly or indirectly impact the water quality and aquatic resources of Giffords Brook. This section of the report will address all potential impacts to aquatic resources expected from the development of a middle school and delineate mitigation measures required to minimize impacts.

FISH POPULATION

Viable fish population habitat was observed in stream stretches upstream of the Pine Street crossing in an area where two small unnamed tributaries are confluent. This area would be considered the upper limit of available fish habitat although it is probable that fish may penetrate upper reaches of Giffords Brook on a seasonal basis. Freshwater fish species expected to inhabit Giffords Brook would be: native brook trout, longnose dace, blacknose dace, American eel, fallfish, and white sucker.

Surface waters of Giffords Brook 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, agricultural and industrial supply, and other legitimate uses.

IMPACTS

The following impacts to Giffords Brook and associated wetlands can be expected if proper mitigation measures are not implemented:

1. Construction site soil erosion and sedimentation of Giffords Brook through increased runoff from unvegetated areas : During construction, topsoil will be exposed and susceptible to runoff events. Surface drainage from the entire site empties into the brook. Erosion and sedimentation due to construction related activities can degrade stream resources in the following ways: reduce the survival of resident fish eggs and aquatic insects, reduce the amount of suitable fish habitat, and decrease dissolved oxygen levels.

2. Aquatic habitat degradation due to the influx of stormwater drainage : The development of this parcel will result in a modification of the local watershed and increase the amount of impervious surfaces. Stormwaters can contain a variety of pollutants that are detrimental to aquatic organisms. Pollutants commonly found in stormwaters are: hydrocarbons (gasoline and oil). herbicides, heavy metals, road salt, fine silts, and coarse sediment. Once introduced into stream environments, stormwater runoff will fertilize stream waters causing water quality degradation.

3. Percolation of septic effluent into Giffords Brook : A failure of the school's septic systems to operate properly is potentially dangerous to aquatic habitats. Nutrients and assorted chemicals that may be placed in septic systems could enter surface waters in the event of a failure or possible infiltrate groundwater, especially when water tables are seasonally close to the surface. The introduction of septic effluent could result in a major threat to fish, public health, and overall water quality conditions.

RECOMMENDED MITIGATION MEASURES

The following mitigation measures should be considered by the Town of Columbia to mitigate impacts to Giffords Brook.

1. It is highly recommended that at the minimum, a 100 foot open space buffer zone be maintained along all wetland boundaries of Giffords Brook : This buffer can be an effective mitigation measure at this development location. No construction and alteration of existing habitat should be allowed in this zone. Research has shown that 100 foot buffer zones help prevent damage to wetlands and stream ecosystems that support diverse fish and aquatic insect life (USFWS 1984;USFWS 1986;0DFW 1985). Impacts such as soil erosion, can be more effectively minimized if these areas are left in their natural condition. These buffers will absorb surface runoff and other pollutants before they can enter aquatic ecosystems.

2. Install and maintain proper erosion and sedimentation controls during site construction activities : Silt fences and haybales should be placed within excavated trenches to ensure that all runoff is properly contained. Proper installation and maintenance of these devices is critical to environmental well being.

3. Properly design and locate septic systems (refer to *SEWAGE DISPOSAL* section) : It is critical that all septic systems be placed in areas that will effectively limit septic effluent. Systems should not be placed adjacent (within 100 feet) to sensitive wetland and stream ecosystems.

4. A detailed stormwater management plan should be devised : The effective management of stormwaters and roadway runoff can only be accomplished through proper design, location, and maintenance of catch basins. Maintenance of catch basins is very critical. Roadway catch basins should be regularly maintained to minimize adverse impacts to riverine/wetland habitats. Stormwaters should not be directly outletted into wetlands. The use of road salt to deice roads should be prohibited.

5. All work near Giffords Brook and/or wetlands for the purpose of road construction should take place during low flow periods : This strategy will help minimize the impact to aquatic resources. Reduced streamflows and rainfall during the summer and early fall provide the least hazardous conditions in which to work near sensitive aquatic environments.

BIBLIOGRAPHY

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12. PLANNING COMMENTS

CONSISTENCY WITH LOCAL, REGIONAL AND STATE PLANS

The Leonard parcel is located in an area zoned as residential - 50,000 sq ft. Local zoning allows the construction of a school in a residential zone by special permit. With the exception of a farm to its north, the parcel is surrounded by residential properties.

Columbia's Town Plan of Development recommends maintaining centralized public facilities and services until such time as population growth warrants the provision of neighborhood services. The town center now includes the town green, historic homes, churches, town hall, elementary school, cemetery, post office, library, and businesses. The site of the proposed new school, intended for all students in grades five through eight, is separated from the Porter School and other town services by about a mile and a half, and would represent the first departure from the present geographical centralization of services.

TheWindham Regional Planning Agency's <u>Regional Growth and Preservation Guide Plan</u> categorizes this site as "Low Density Rural," suitable for the preservation of agricultural lands and operations, creation of new recreational facilities or nature preserves, and minimization of the development of existing road frontages. With the school building situated in the interior of the parcel as indicated on preliminary sketches, the road frontage would remain undeveloped. The large size of the Parcel (+/- 105 acres) offers an opportunity for the town to preserve open space and to provide recreational facilities.

The State Plan of Conservation and Development classifies the parcel as "rural land." On such land the State encourages avoiding any development which would exceed the on-site carrying capacity for water suply and sewage disposal, which would be inconsistent with the rural character of adjacent areas, or which is more appropriately located in Rural Community Centers. While the siting of a school on this parcel is not inconsistent with the State Plan, a site closer to Columbia's town center would be considered preferable for such an intense land use.

OTHER CONSIDERATIONS

Most access to the school would be via Route 66 and Pine Street. While Pine Street is a narrow road, it is probably one of the straightest narrow roads in town and appears to have no sight line problems approaching the proposed school driveway from either the north or south. Some widening may be required to comfortably handle passing school buses and turning lanes at the school entrance.

Safety improvements would be needed at the intersection of Route 66 with Pine St. (to the south) and Hennequin Rd. (to the north). This intersection, currently served by an overhead blinking light, lies at the low Point in the road between two hills which present vertical sight-line problems. It has been identified in ConnDOT's most recent Traffic Accident Surveillance Report (TASR, 1/1/86 - 12/31/88) as one with a high accident rate - almost three times that which would normally be expected at such an intersection. Westbound vehicles on Route 66 have marginally adequate warning of the intersection as they arrive at the crest of the hill to the east, and this vertical sightline problem is often compounded by excessive speed.

The 1988 Average Daily Traffic (ADT) on this section of Route 66 was estimated at 9100 vehicles (both directions combined). No traffic counts are available for Pine Street. It should be noted that traffic volumes on Pine Street may eventually be affected by the Island Woods cluster subdivision off of Wells Woods Rd. The original concept plan for this development included a loop road fromWells Woods Rd. extending around Mono Pond and outletting at Hunt Rd., not far from its intersection with Pine St. Only the property on the western side of Mono Pond has been developed to date, and road construction has been limited to that portion serving the developed sites.

FUNDING

The parcel size recommended by the state for a middle school is 15 acres plus one additional acre for each 100 students in the school. For a school planned for 400 students, 19 acres would be needed. The Leonard Parcel exceeds that requirement by approximately 85 acres. The State share of funding for the purchase price of the land would apply only to that portion required for the school. The remaining acreage which the town would preserve as open space would have to be funded by the town without reimbursement from the State.

In its decision making, the town needs to separate the issues of the need for a schoo! site and the desirability of purchasing land to preserve as open space. The excess acreage in this parcel - beyond that needed for a school site should be judged separately on its merits as open space when compared to other undeveloped land in town.

If the town is committed to purchasing additional open space, and if the Leonard property would fall high on its priority list of parcels to acquire for that purpose, it would make sense for the town to purchase it at this time whether or not a new school is constructed. A portion of it could always be used as a future school site if needed.

On the other hand if the town is not enthusiastic about in this particular parcel for its value as open space, then purchasing the 105 acres primarily to satisfy the need for a school site becomes a very expensive alternative.

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