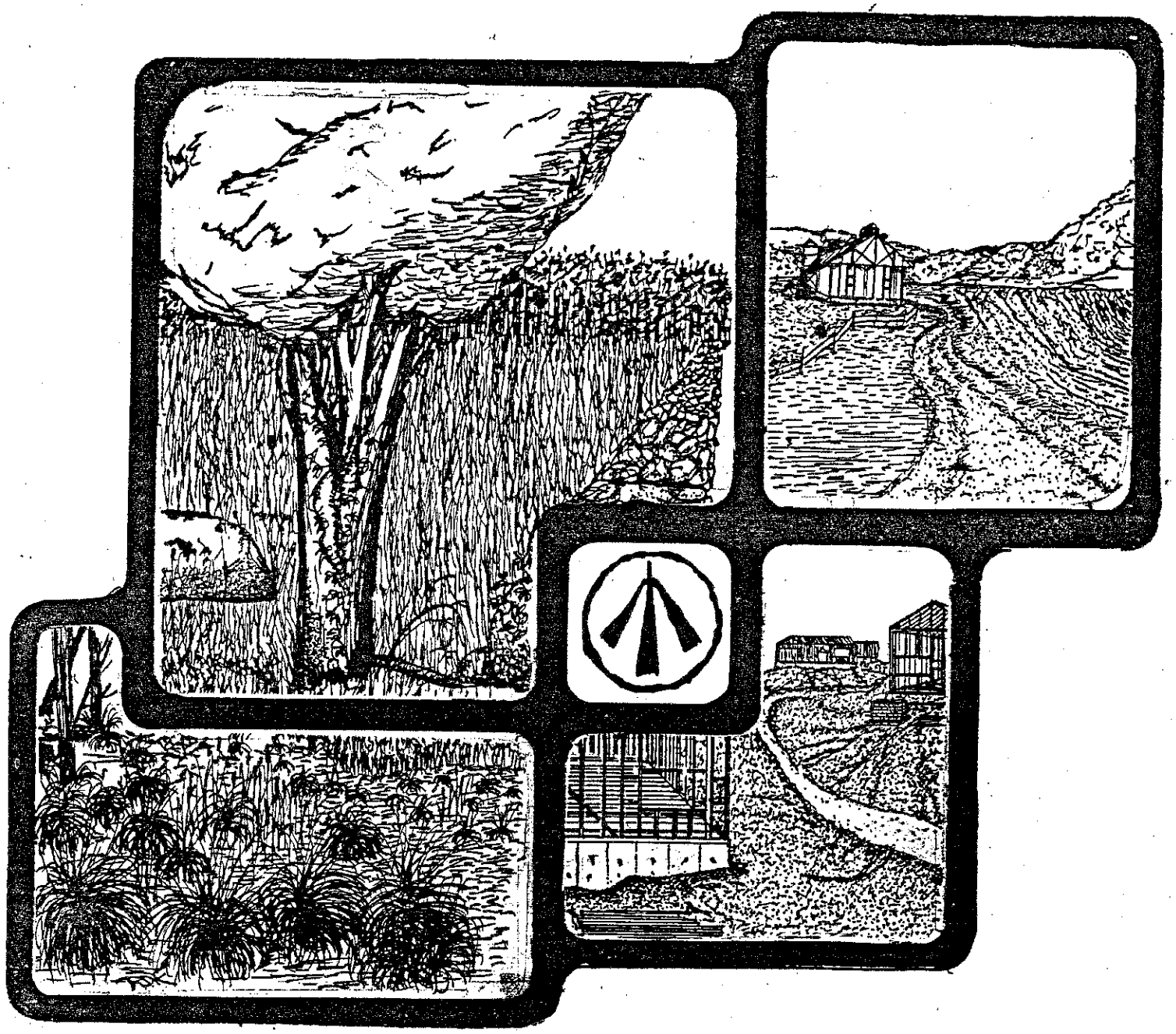
ENVIRONMENTAL REVIEW TEAM REPORT

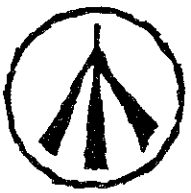


BEAVER BROOK FLOOD CONTROL PROJECT
MILFORD, CT

KING'S MARK
RESOURCE CONSERVATION & DEVELOPMENT AREA

KING'S MARK
ENVIRONMENTAL REVIEW TEAM REPORT

BEAVER BROOK FLOOD CONTROL PROJECT MILFORD, CT SEPTEMBER 1984



King's Mark Resource Conservation and Development Area
Environmental Review Team
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The King's Mark Environmental Review Team operates through the cooperative effort of a number of agencies and organizations including:

Federal Agencies
U.S.D.A. Soil Conservation Service

State Agencies
Department of Environmental Protection
Department of Health
University of Connecticut Cooperative Extension Service
Department of Transportation

Local Groups and Agencies
Litchfield County Soil and Water Conservation District
New Haven County Soil and Water Conservation District
Hartford County Soil and Water Conservation District
Fairfield County Soil and Water Conservation District
Northwestern Connecticut Regional Planning Agency
Valley Regional Planning Agency
Central Naugatuck Valley Regional Planning Agency
Housatonic Valley Council of Elected Officials
Southwestern Regional Planning Agency
Greater Bridgeport Regional Planning Agency
Regional Planning Agency of South Central Connecticut
Central Connecticut Regional Planning Agency
American Indian Archaeological Institute
Housatonic Valley Association

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FUNDING PROVIDED BY
State of Connecticut

POLICY DETERMINED BY
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Richard Lynn, ERT Coordinator
Jamie Whitman, ERT Cartographer
Jamie Whitman, Secretary

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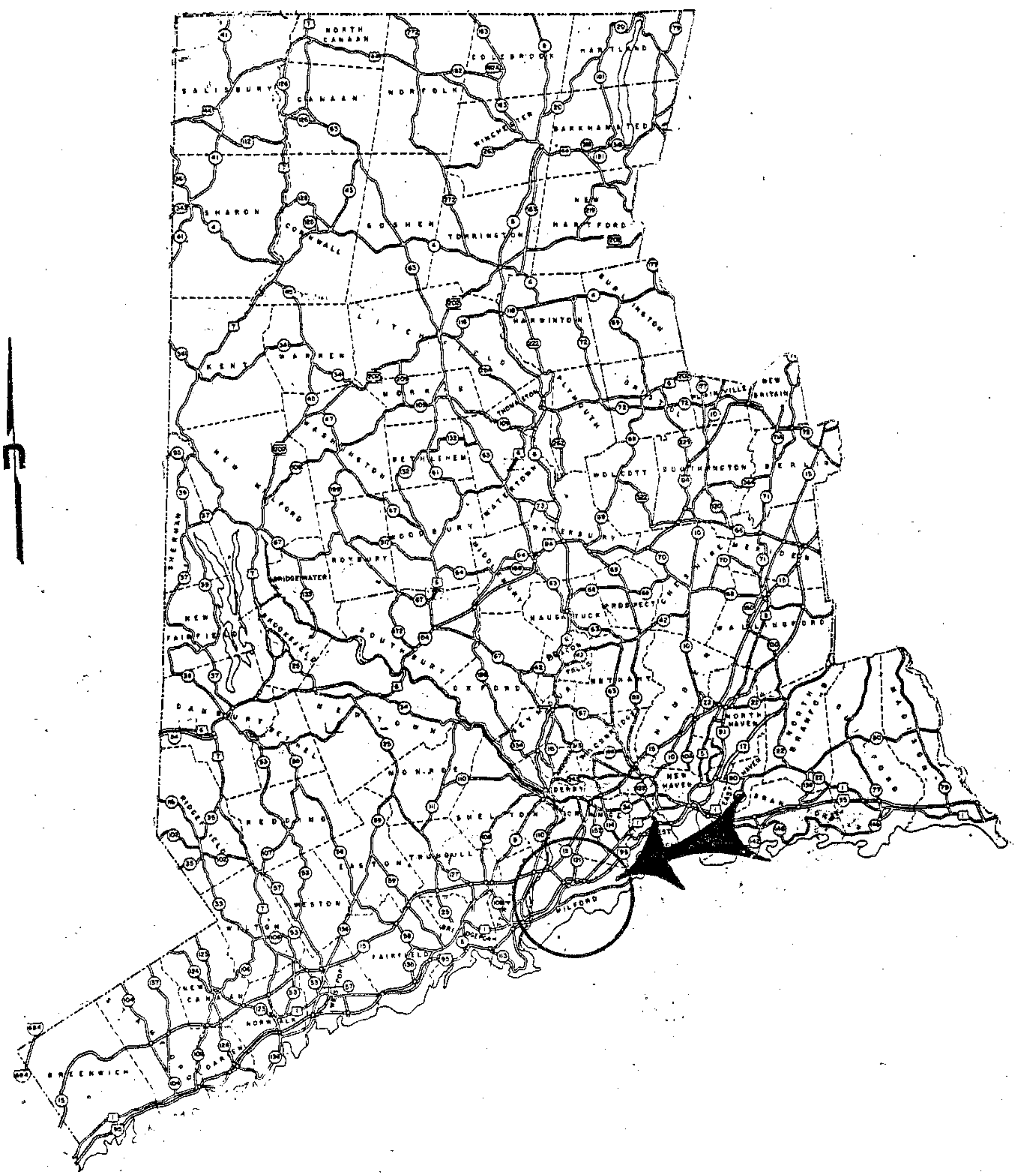


Scale 1" = 10 miles

10 0 5 10 miles

BEAVER BROOK FLOOD CONTROL PROJECT

I. Introduction

The preparation of this report on the proposed "Beaver Brook Flood Control Project" was requested by the Mayor of Milford.

As shown in Figure 1, the headwaters of Beaver Brook to its intersection with Plains Road is fed by a watershed of ± 228 acres. Just northwest of the intersection of Plains Road and West Rutland Road (see Figure 1) is a ± 5 acre area of land which experiences flooding during both low and high frequency storm events. This flooding is causing damage to the nine residences and properties which are located in this area. The flooding results from a back-up of water along Beaver Brook in this vicinity, and also from runoff from the northeastern area of the watershed.

Presently, a ± 4 acre detention basin is being constructed about 800 feet upstream of the floodprone area as part of a residential development. The City is interested, however, in the feasibility of additional flood control in the area. Specifically, the City is interested in the construction of additional flood detention capacity on a ±10 acre parcel of land presently owned by the South Central Connecticut Regional Water Authority. This 10 acre parcel has been classified as excess to the Water Authority's needs and is located just upstream of the floodprone area (see Figure 2).

As a first step in the planning and design of the Flood Control Project, this ERT study was requested. The Team was asked to: 1) identify the geology and soils in the subject area, 2) discuss the hydrology of the watershed area, and 3) discuss the suitability of the site for the proposed project.

The King's Mark Executive Committee considered the Town of Milford's request for an ERT study, and approved the project for review by the Team.

The ERT met and field reviewed the site on July 11, 1984. Team members participating on this project included: Charles Berger, Engineer, CT Department of Environmental Protection; Marc Beroz, Soil Scientist, USDA Soil Conservation Service; David Lord, District Conservationist, USDA Soil Conservation Service; Richard M. Lynn, ERT Coordinator, King's Mark RC&D Area; and William Warzecha, Geohydrologist, CT Department of Environmental Protection.

Prior to the review day, each team member was provided with a summary of the proposed study, a checklist of concerns to address, a topographic map, a soils map and a soils limitation chart. During the ERT's field review,

FIGURE 1
WATERSHED MAP

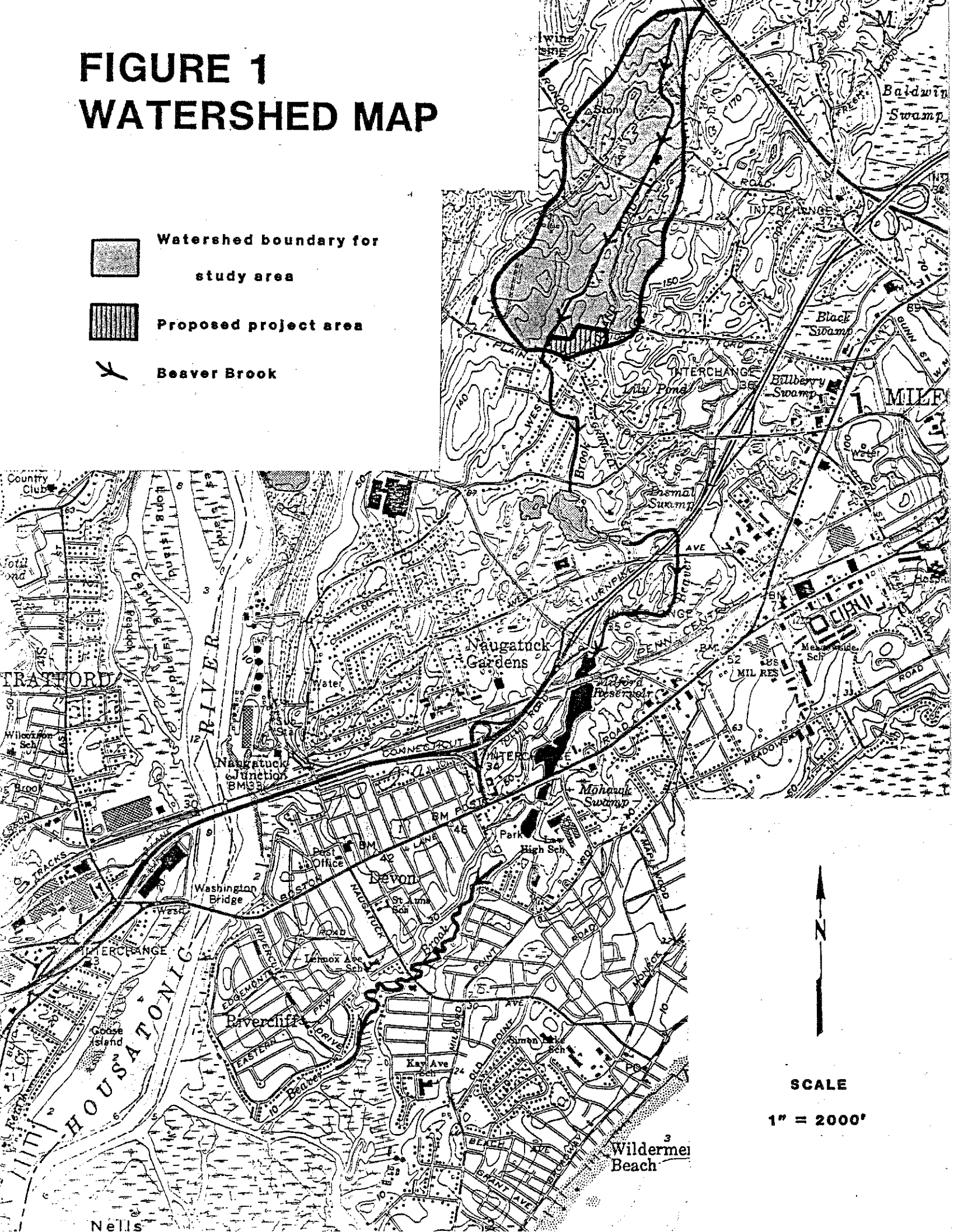
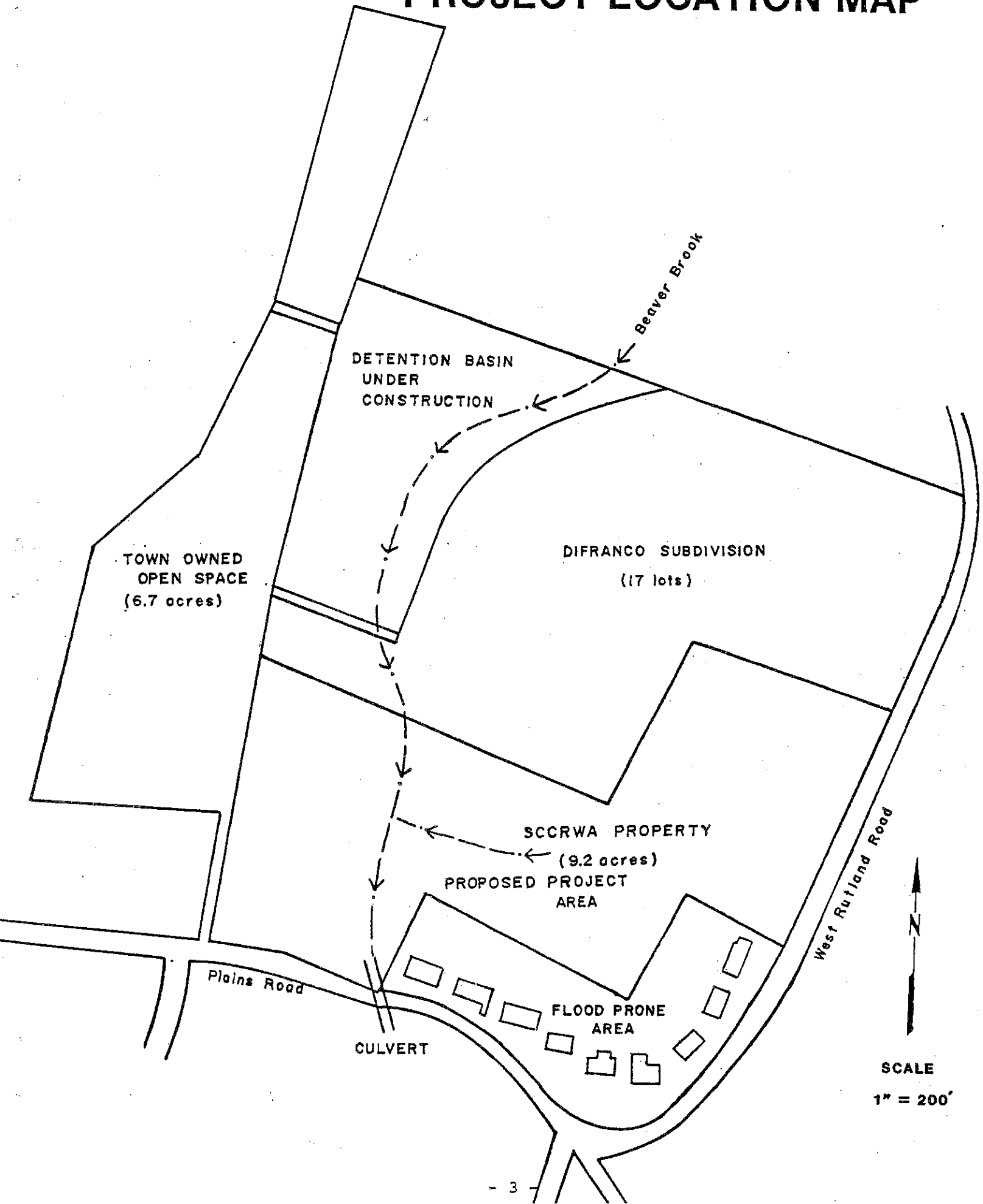


FIGURE 2
PROJECT LOCATION MAP



team members met with representatives from the Town of Milford and walked the property. Following the field review, individual reports were prepared by each team member and forwarded to the ERT Coordinator for compilation and editing into this final report.

This report presents the Team's findings The report identifies the geology, soils, and hydrology of the subject area and discusses opportunities and limitations for the proposed flood control project. It is hoped the information contained in this report will assist the Town of Milford in making environmentally sound decisions.

If any clarification of the report is required, please contact Richard Lynn (868-7342), Environmental Review Team Coordinator, King's Mark RC&D Area, Sackett Hill Road, Warren, Connecticut, 06754.

* * * * * * *

II. Summary

1. *Much of the watershed is presently undeveloped and zoned primarily for residential use. Future development of the watershed without stormwater management will increase present flooding problems in the watershed. In light of this, consideration should be given to implementing a "zero increase in run-off" stormwater management plan for the watershed. Such a plan would require that all future subdivision development in the watershed include provisions for effective on-site detention of stormwater. (p. 14)*

2. *Depending on design, the proposed detention basin could reduce and control peak flows; minimize erosion and sedimentation problems; help control potential flooding problems in the local area; and improve water quality. Also, depending upon its design, it may be possible to use the basin for recreation purposes. If the detention basin is constructed as a pond, it can be used for fishing, open space, habitat for wildlife, skating, etc. On the other hand, if the detention basin is constructed as a "dry bottom facility", it too may be used for recreational purposes (e.g., baseball, soccer, football fields) during dry periods. (p. 15)*

3. *In order to effectively mitigate the flooding problems being experienced by homes fronting West Rutland Road and Plains Road, it appears that the construction of a channel will be required just north of the Patray residence. This channel should be grass-lined and constructed with sufficient gradient. The purpose of this channel, which would run generally east-west would be to intercept surface runoff that flows parallel to West Rutland towards the flood-prone area. Once it collects the surface water, the channel would transport the water to the proposed detention basin facility. (p. 15)*

4. *The site proposed for the detention basin is underlain by Agawam soils. These sandy and gravelly soils have rapid permeability and are well-suited for detention basins. The soils have poor suitability for embankments, however, due to seepage. More suitable material may have to be brought in to construct a dike around the basin. (p. 15)*

5. *There appears to be three basic alternatives available for construction of a detention basin in the subject area. One alternative would be to excavate the area and lower the invert elevation of the culvert under Plains Road. This alternative would offer the most storage capacity. A second alternative would be to construct an embankment detention basin to approximate elevation 98 on the site. This alternative would provide very limited storage capacity, but would be effective in mitigating flood damage from some of the*

smaller storm events. The third alternative would entail excavating the area, but leaving the culvert under Plains Road at its current elevation. This would likely provide a storage capacity somewhere between the other two alternatives, depending upon the water level maintained in the basin. Should alternative one or three be chosen, it would be desirable to monitor the ground water levels in the area via an observation well or wells on the site. It would also be desirable to observe water flows through Beaver Brook during the wet time of the year. Consideration should also be given to installing and maintaining a sediment trap if either alternative one or three is chosen. This will help maintain the permeability of the bottom of the basin. Construction of the diversion channel from West Rutland Road to the detention basin would be desirable under any of the three alternatives. (p. 19)

6. *Any future flood control in the area should be subject to a detailed hydrologic and hydraulic analysis of the watershed. It should include an identification of flood hazard and development potential within the watershed. As the residential area along Plains Road appears to be of immediate concern, the establishment of defined channels from north to south and from the northeast should be considered. Floodproofing individual structures and/or the construction of curtain drains around foundations to reduce hydrostatic pressures should also be considered. (p. 20)*

7. *If the City of Milford decides to pursue flood control in this area, the City should collect as much flood damage information as possible from the affected residents living on and below Plains Road. This information can be used in making application to the King's Mark Resource Conservation and Development Area Executive Committee for a flood control measure on Beaver Brook. Should an RC&D Flood Control Project be found not economically practicable, under Federal program guidelines, then application can be made to the Water Resources Unit of the Connecticut Department of Environmental Protection for a state/local cost shared flood control project. (p. 20)*

III. Topography and Geology

The study area consists of the Beaver Brook watershed at the point where the brook enters the 24-inch pipe passing under Plains Road (see Figure 1). The watershed may be defined as the land area that drains runoff to the brook. The size of the watershed as shown in Figure 1 is approximately 228 acres or .36 square miles. The watershed is located in the western limits of town, approximately one-half mile east of the Housatonic River.

The land surface throughout the watershed ranges from relatively flat slopes to moderate slopes (see Figure 1). Moderate slopes are found mostly on the east side of Rutland Road. Maximum and minimum elevations in the watershed are ± 200 feet and ± 90 feet above mean sea level.

Based on the Milford topographic quadrangle, there are at least three small surface water bodies in the watershed.

The study area is located in a section of Milford which is included in the Milford topographic quadrangle. Both the bedrock geologic map (GR-427, by Crawford E. Fritts) and the surficial geologic map (QR-23 by Richard Foster Flint) have been published for the quadrangle. They are available for purchase or review at the Natural Resources Center, Department of Environmental Protection, in Hartford.

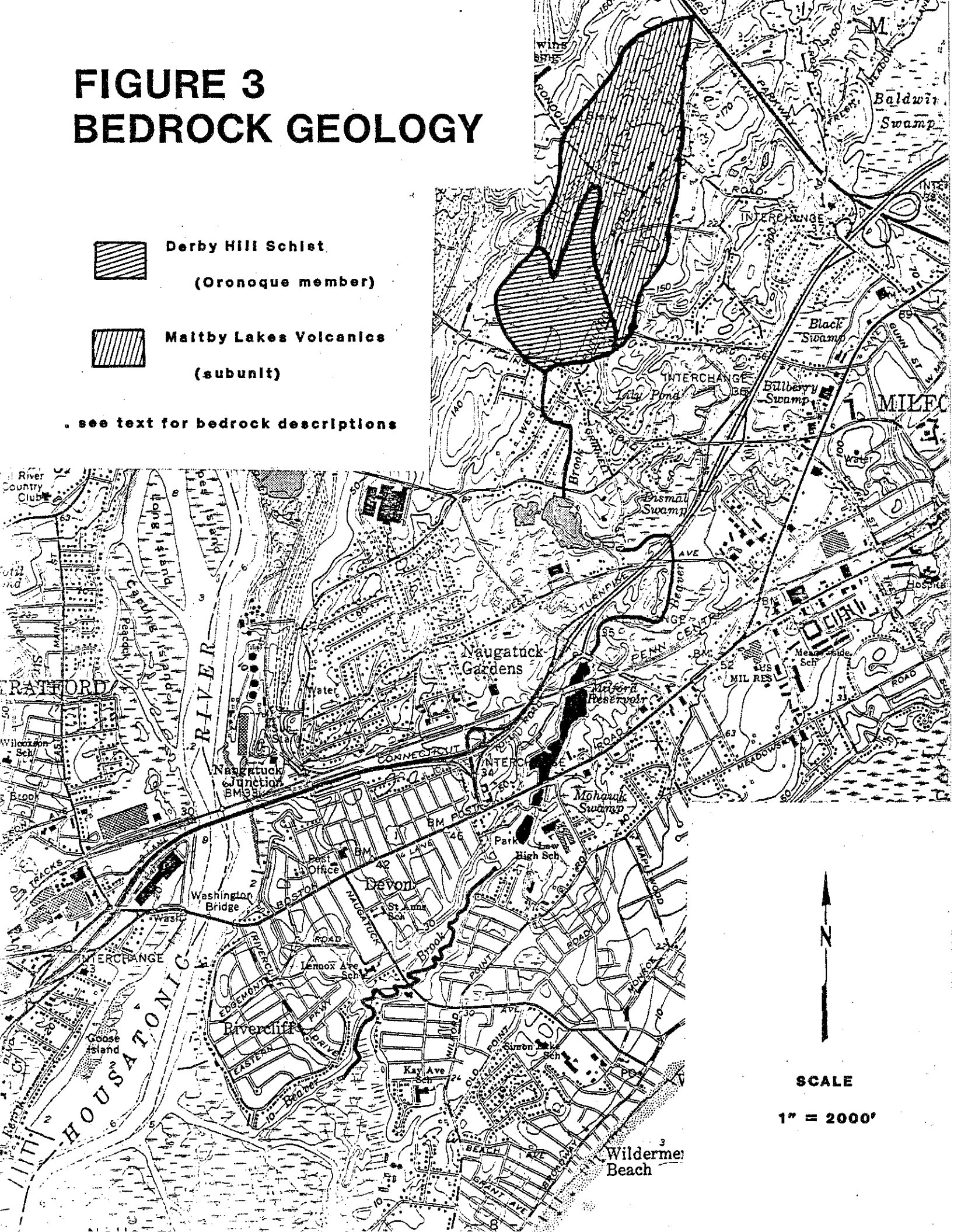
BEDROCK GEOLOGY

The bedrock geologic map for the Milford quadrangle (GR-427) classifies the rocks underlying and/or cropping out in the watershed as subunits of the Maltby Lakes Volcanics and Derby Hill Schist Formations (see Figure 3). The predominant rock type found in the watershed is a member of the Maltby Lakes Volcanics. This rock unit consists of medium-to-fine grained volcanic rocks which have been partly metamorphosed (i.e., altered by great heat and pressure deep within the earth's crust). "Volcanic rocks" are rocks which have been poured out or ejected at or near the earth's surface. The rock is a dark-gray to grayish-black amphibolite composed of the minerals hornblende, sodic andesine, quartz and epidote. Minor minerals include sphene, ilmenite, rutile, apatite and pyrite. The term "amphibolite" refers to a rock which is composed mainly of dark-colored minerals of the amphibole group, especially hornblende.

The Oronoque Member of the Derby Hill Schist underlies or crops out in the southern half of the watershed The rock consists of a medium-to-fine grained, greenish-gray to medium dark-gray gneiss composed mainly of the mineral quartz and plagioclase feldspar (albite) with lesser amounts of green and brown biotite and garnet. An outcrop studded with garnet crystals is visible north of the Patry residence on West Rutland Road. Also, there are some schist layers in the rock, which contain abundant muscovite and chlorite.

The term "gneisses" and "schists" mentioned above refer to the textural and structural characteristics of the rocks. Both are crystalline, metamorphic (geologically altered) rocks. A "gneiss" is a banded or streaked rock while the schist is a structurally layered rock. Often, layers of

FIGURE 3
BEDROCK GEOLOGY



schist and layers of gneiss may be found intermixed in a single rock outcrop.

Bedrock exposures within the study area are visible mainly in the areas delineated as HpE (Hollis-Charlton) on the accompanying soils map (see Figure 6). Rock outcrops were observed on the review day north of the flood-prone area and along West Rutland Road in the eastern limits of the study area.

If the project is implemented, several test holes should be excavated in the area of the proposed detention basin to determine if an adequate depth for the pond can be accomplished. According to the present plans, the proposed project (detention basin) would also include the construction of an open channel which would extend from the east side of the detention basin (see Figure 4). The purpose of this channel would be to intercept surface runoff flowing from the area northeast of the flood-prone area It would ultimately discharge the collected water into the detention basin.

A ridge of bedrock outcrop appears to run in a northeast-southwest direction in the area between the proposed detention basin and West Rutland Road. Due to the presence of bedrock, it may be necessary to blast the rocks in order to construct the channel so that water can flow by gravity to the detention basin.

SURFICIAL GEOLOGY

Surficial geologic materials are those unconsolidated mineral and organic materials that overlie bedrock. These materials are also referred to as overburden. According to Map QR-23, two types of glacial sediments predominate in the study area: till and lake-bottom sediments. A relatively thin blanket of till covers the eastern and western limits of the study area (see Figure 5). Till is a glacial sediment that was deposited directly from an ice sheet. It contains non-sorted, mixtures of rock particles and fragments ranging in size from clay to boulders. The texture of till is also variable, ranging from sandy and loose to silty and tightly compact. Thicknesses of the till range from zero in rock outcrop areas to probably not much more than 10 feet at various points in between outcrops.

The other glacial sediments, which cover the central part of the study area, are lake-bottom sediments. These sediments consist of parallel layers of silt, clay, and sand which were deposited in temporary glacial lakes dammed by chunks of ice or by other sediments (sand and gravel) originating from the ice sheet. Thicknesses of the lake bottom sediments range from a few inches at the till/stratified drift contact to probably not more than 10 feet in the remaining portions of the study area which it covers.

Low-lying areas in the study area, primarily along Beaver Brook and in the eastern limits may contain swamp deposits. "Swamp" deposits consist mainly of silt, sand, and clay mixed with organic matter in poorly drained areas. Because these areas provide storage of stormwater during periods of precipitation, filling and/or modification of these areas should be avoided, if possible.

FIGURE 4
CONCEPTUAL PROJECT DESIGN

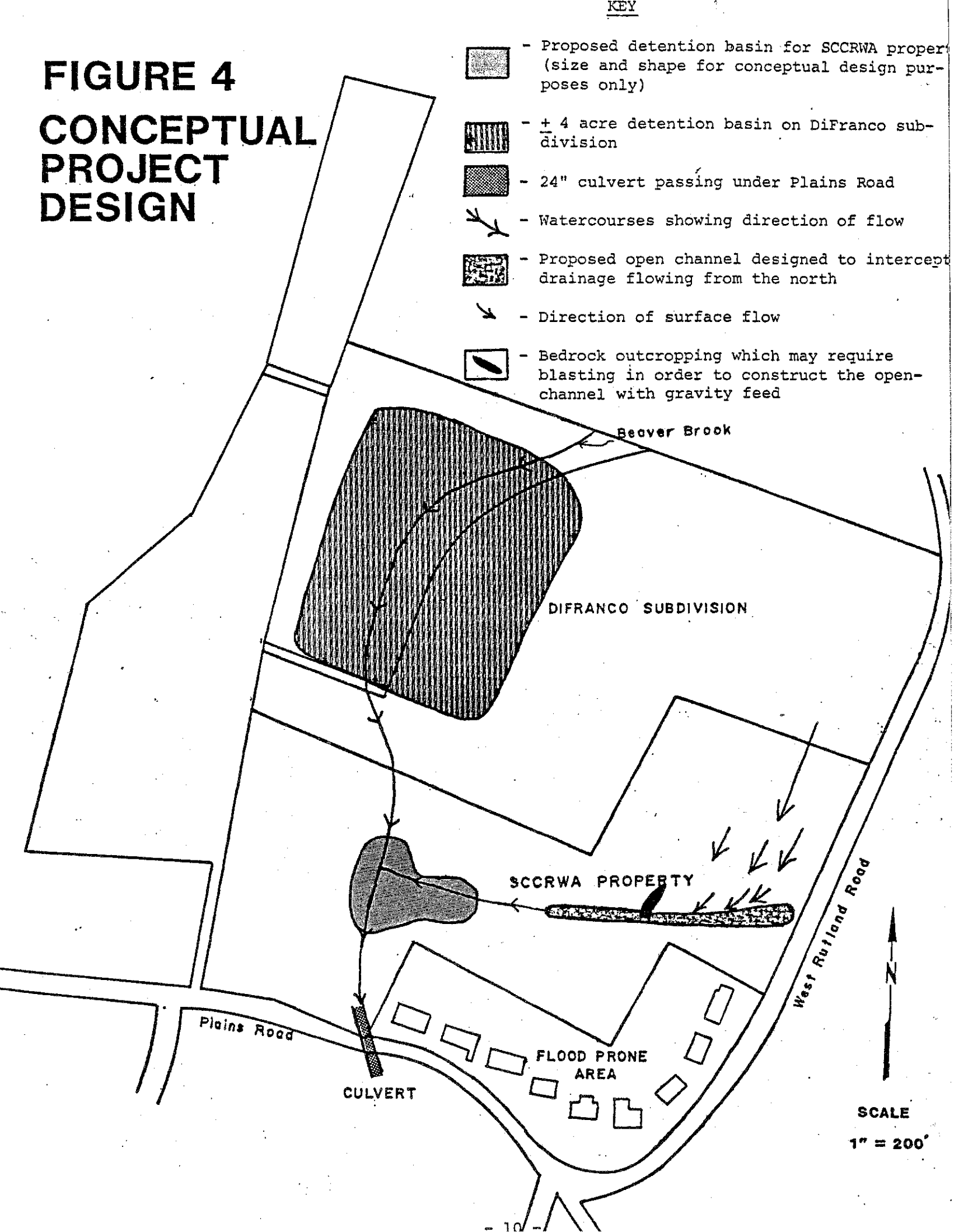
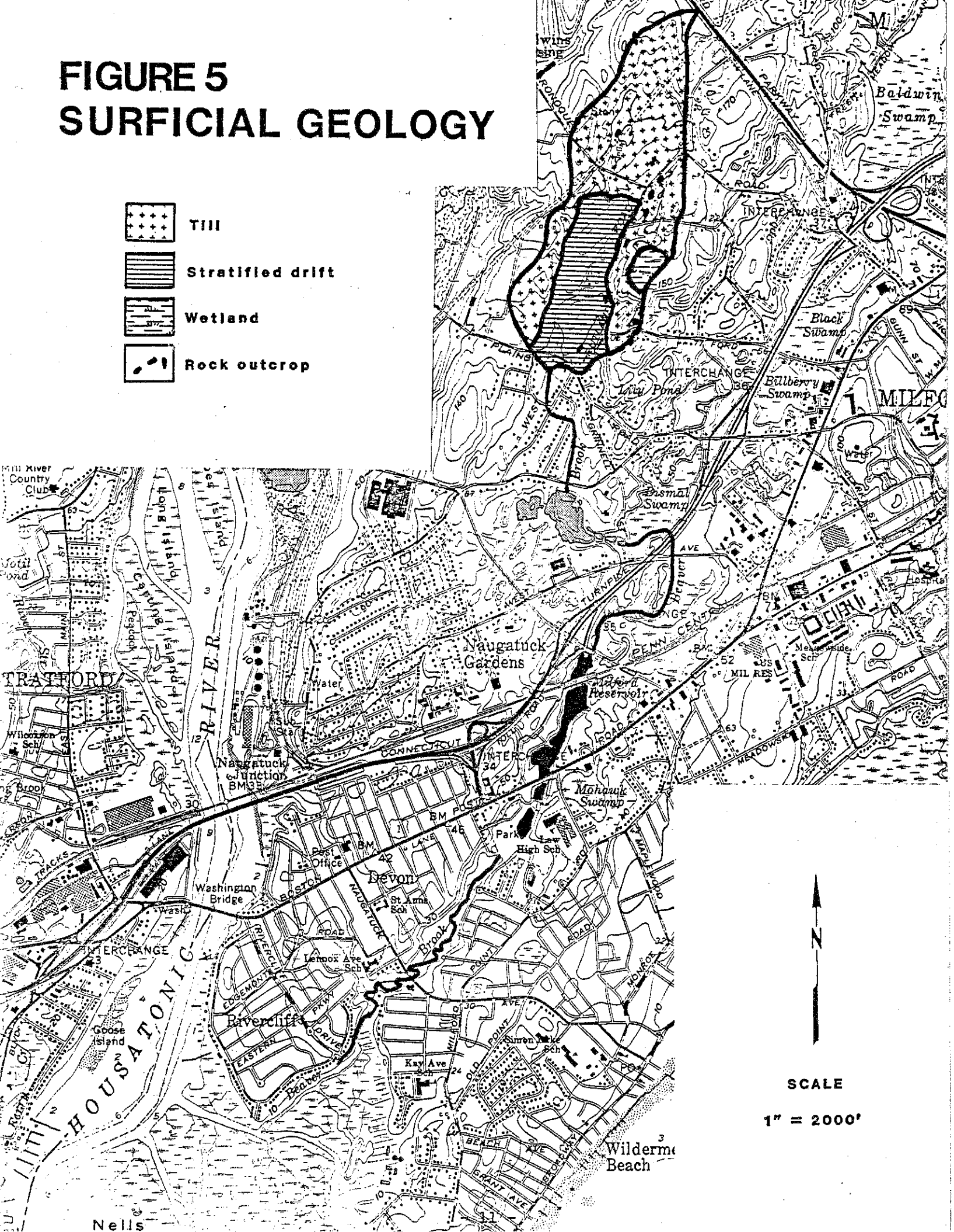


FIGURE 5
SURFICIAL GEOLOGY



IV. Hydrology

As shown in Figure 1, the watershed boundary for the study area tends to follow along the crests of local ridges and hills that divide adjacent watersheds. Theoretically, a drop of rain that falls squarely on a watershed divide has a 50-50 chance of flowing into one watershed or an adjacent one. The point of outflow (design point) chosen for this review is at the twenty-four inch culvert which passes under Plains Road. Beaver Brook bisects the watershed generally in a north-south direction. The Brook continues to flow in a southerly direction en route to Milford Reservoir where it is temporarily stored. The Brook flows from the Milford Reservoir into the Housatonic River, which ultimately empties into Long Island Sound.

Surface runoff in the watershed runs across the land as sheet flow towards local discharge areas (e.g., streams, ponds, wetlands, intermittent drainage channels). Some of this water moves downward through the soil until it reaches the zone of saturation, where pore spaces between rock and soil particles are saturated with water. This zone is referred to as groundwater. The top of the saturated zone is called the water table. Once water reaches the saturated zone, it begins to move slowly by the force of gravity through pore spaces towards discharge areas. Discharge areas may include wetlands, springs, rivers and/or streams. Therefore, it may be said that groundwater and surface water are interconnected, since groundwater becomes surface water when it flows into surface water bodies. Groundwater flows in the study area generally parallel surface runoff flows, moving from the higher areas in the watershed to the lower discharge areas.

A Flood Insurance Rate Map has been prepared for the Town of Milford by the Federal Emergency Management Agency. The map identifies areas within the town which lie within the 100-year and 500-year flood boundary. A "100-year flood" would be a flood with 1 chance in 100 or 1 percent chance of occurring during a given year. A "500-year flood" would have a 1 chance in 500 or .2 percent chance of occurring during a given year. Based on the F.E.M.A. map, the watershed lies in an area which has minimal flooding. Nevertheless, there may be low-lying swampy areas within the study area which become inundated during periods of heavy precipitation. According to information supplied to Team members by town officials, one of these areas is in the rear yards of houses fronting West Rutland Road and Plain Roads in the southern portion of the watershed. Based on visual inspection, it appears that a topographic swale which carries surface water during wet periods had been filled in with material so that the above mentioned homes could be constructed and their respective backyards established. This filling has created a "dam" across the swale which prevents the water from flowing naturally southward towards Beaver Brook. As a result, the rear yards of homes, which front primarily on West Rutland Road, experience flooding during periods of heavy rain. Furthermore, the ridge of bedrock

(running northeast-southwest) which is northwest of the flood-prone area obstructs the water from moving westward. The purpose of this study, therefore, was to assist the town in determining whether or not the construction of the detention basin and an open channel will effectively mitigate the flooding conditions experienced in the flood-prone area.

Further development in the study area will cause increases in the volume of runoff to Beaver Brook unless some type of runoff control device(s) such as a detention basin(s) is established. These increases would be caused largely by removal of vegetation, compaction of soils, and creation of impervious surfaces such as roofs, paved roads, driveways, and parking areas. The amount of increase will depend upon the ultimate density of development.

It is possible to estimate the peak flows at the culvert passing under Plains Road that occur under present conditions and if the watershed is "fully developed."*

One method for doing this is outlined in Technical Release No. 55 (TR-55) of the U.S.D.A. Soil Conservation Service. This method involves the estimation of runoff curve numbers for the affected watershed. The curve numbers relate the amount of precipitation during a storm event to the amount of direct runoff from the land. Criteria for determining the curve numbers include slope of the land, soil type, land use and type of vegetative cover. Estimates are provided for 24-hour rainfall amounts that would be expected to occur over a very long period of time: once every 10 years, once every 25 years, once every 50 years, and once every 100 years. In any given year, these rainfall amounts have respectively a 10 percent, 4 percent, 2 percent, and 1 percent probability of occurring. Results are given in the following table. It should be noted that the estimates below are meant only to indicate the prospective magnitude of the increases; they are not designed to indicate exact flow rates (which may be significantly higher or lower than the estimate given) nor should they be used for engineering data or designing the proposed detention basin.

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*It was assumed that "full development" in the study area would be about 80 percent of the watershed or ± 176 acres. Much of the watershed is presently undeveloped and zoned primarily for residential use.

Estimated peak flows (cubic feet per second) where Beaver Brook passes through the culvert under Plains Road

	10-yr storm	25-yr storm	50-yr storm	100-yr storm
Present conditions	60 CFS	83 CFS	114 CFS	153 CFS
After development, 80% of the watershed developed	104 CFS	136 CFS	177 CFS	229 CFS
Percent increase	70%	64%	55%	50%

Note: Estimates given for "after development" conditions do not account for paved surfaces for access roads serving potential subdivisions in the watershed nor do they account for the layout of artificial drainage channels or any other man-made features. Also, it was assumed that potential lots in the watershed would be approximately 1 acre in size.

As the estimates given above suggest, peak flow increases to Beaver Brook can be expected to be substantial following "full development" of the watershed. It is also expected that this condition could cause increases in peak flood flows downstream. In addition, there is a substantial potential for erosion and sedimentation problems due to increases in runoff from future developments in the watershed. Therefore, it is recommended that a detailed stormwater management plan which incorporates erosion and sediment control measures, be formulated and implemented with each new development in the watershed. In this regard, the town may wish to adopt an ordinance which requires that off-site flows following a development be maintained at present levels. As a result, each developer would have to do his or her part to prevent the impact of increased and/or concentrated runoff from future developments. An example of this is the construction of the ± 4 acre detention basin currently under construction on the DiFranco property north of the study area.

The most likely resolution for increased peak flows from potential developments would be the installation of a detention basin or basins. Detention basins, if properly located, constructed, and maintained can be an effective and economical method of stormwater management. They store runoff for a generally short period of time, releasing it more slowly than otherwise would be the case. It may be possible to combine the detention basin or basins with a sediment retention function. If this is done, it will be necessary to maintain the basin so that a build-up of sediment does not decrease the basins ability to store the water.

The detention basin which is currently being considered for construction by the town is located north of Plains Road in the southern limits of the watershed. It would be constructed on a ± 10 acre parcel of land currently owned by South Central Connecticut Regional Water Authority.

Depending on detention basin design, it could reduce and control peak flows; minimize erosion and sedimentation problems; help control potential flooding problems in the local area; and improve water quality. Also, depending upon its design, it may be possible to use the basin for recreation purposes. If the detention basin is constructed as a pond, it can be used for fishing, open space, habitat for wildlife, skating, etc. On the other hand, if the detention basin is constructed as a "dry bottom facility", it, too, may be used for recreational purposes (e.g., baseball, soccer, football fields) during dry periods.

In order to effectively mitigate the flooding problems being experienced by homes fronting West Rutland Road and Plains Road (i.e., the flood-prone area on Figure 2), it appears that the construction of a channel will be required just north of the Patray residence. This channel should be grass-lined and constructed with sufficient gradient. The purpose of this channel, which would run generally east-west would be to intercept surface runoff that flows parallel to West Rutland towards the flood-prone area. Once it collects the surface water, the channel would transport the water to the proposed detention basin facility. As mentioned earlier, the presence of bedrock at or near ground surface north of the affected homes may preclude the installation of the gravity flow channel, unless it is blasted away. It appears that the construction of the opened, grass-lined channel just north of the flood-prone area would be the most effective way to mitigate the flooding problems currently being experienced by the homes. If the channel was constructed farther north, bypassing the bedrock outcrops, it may intercept some surface water flow. However, it seems likely that homes in the flood-prone areas would probably still experience some flooding problems.

V. Soils

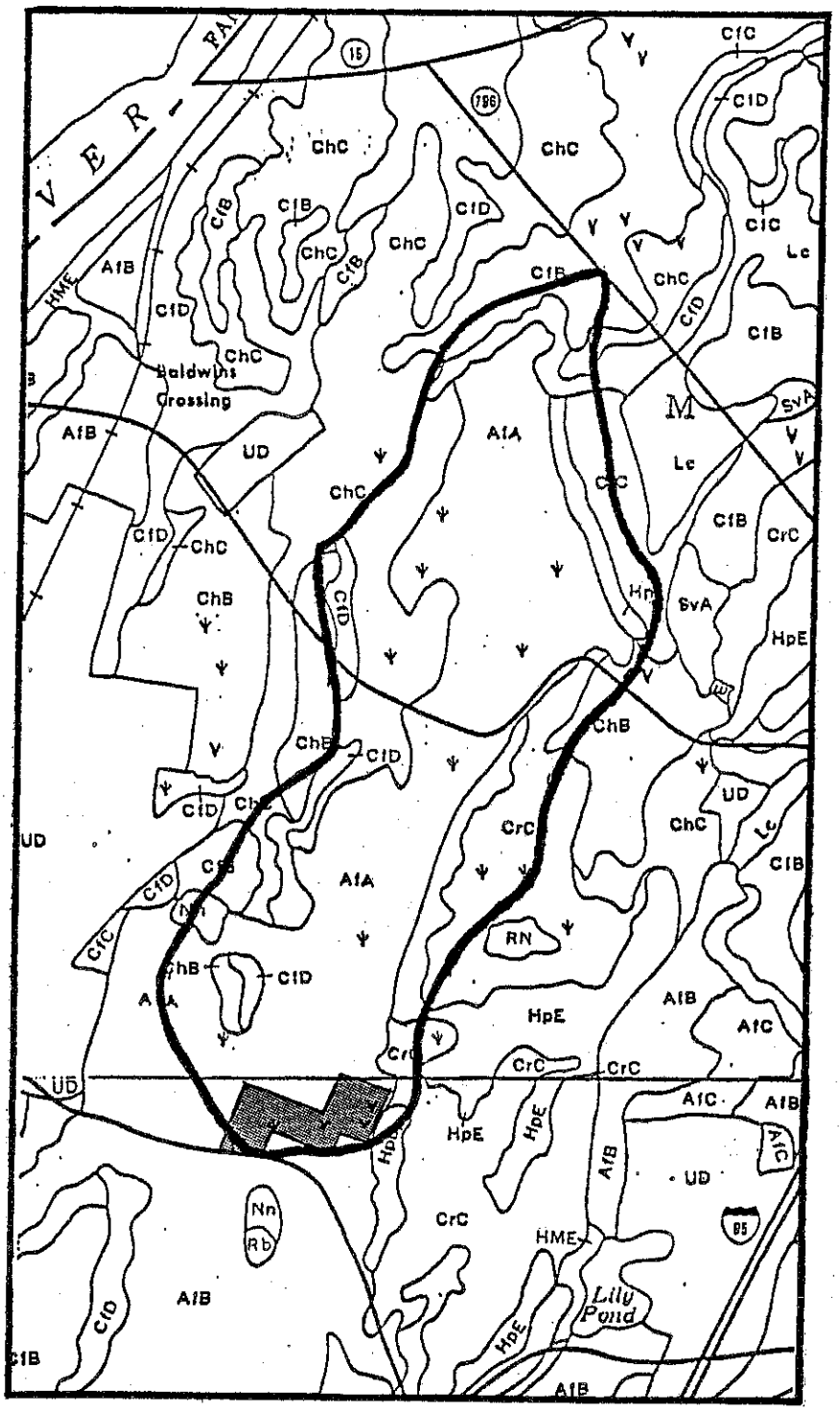
Figure 6 and the following narrative are a revision of data contained in the Soil Survey of New Haven County, Connecticut. The symbols on the map identify map units. Each map unit has a unique composition of soils. Areas with the same symbol have the same composition.

Map Unit AfA

This map unit is composed primarily of Agawam soils on 0 - 3 percent slopes. These soils are very deep and well drained. Typically they have a fine sandy loam surface layer 32 inches thick over sand and gravel to a depth of 60 inches or more.

The depth to sand and gravel varies considerably within this map unit. In some places the soils consist solely

FIGURE 6
SOILS MAP



N

SCALE

1" = 1320'

SCCRWA property

Rock outcrops

Wet spots

note: see text for discussions of soil types

of coarse textured materials. Soils that are composed entirely of sands and gravels can be found in spots north of the DiFranco subdivision. The sand and gravel layer also includes significant amounts of cobble sized rock fragments.

There are some shallow depressions in this area mapped AfA that collect water after heavy rains and during periods of snowmelt. These depressions have soils that are moderately well to poorly drained. These wet spots are identified with the symbol " Ϋ " on Figure 6.

The soils on the South Central Regional Water Authority Property are also mapped as Agawam; however, the depth to sands and gravel is deeper than typical. Here the depth to coarse textured material ranges from 25 to 54 inches but is mainly between 40 and 50 inches.

There are exposures of rock outcrop on the east side of the property adjacent to West Rutland Road. These areas of rock are identified with the symbol "V" on Figure 6.

The fast permeability of the sand and gravel make the Agawam soils well-suited for detention basins. The water collected in a basin can be metered out downstream as well as added to the groundwater table by infiltration and percolation through the pond bottom. Some spots mapped as Agawam on the water company property are moderately well to poorly drained. These areas will add water to the detention basin, however the amount of water should be relatively small and not greatly affect the performance of the basin.

The Agawam soil has poor suitability for embankments due to seepage. More suitable material may have to be brought in to construct a dike around the basin.

The Agawam soils are in hydrologic group B.*

Map Units CfB, CfD, ChB and ChC

These map units have Charlton soils as the principal component. Slopes are 3 to 8 percent on the CfB and ChB units; 8 to 15 percent on ChC and 15 to 25 percent on CfD. The Charlton soils are very deep, well drained and have fine sandy loam textures to a depth of 60 inches or more.

The Charlton soils are in hydrologic group B.

---

*The hydrologic soil groups, as defined by SCS soil scientists, are:

A. (Low runoff potential). Soils having a high infiltration rate even when thoroughly wetted and consisting chiefly of deep, well to excessively drained sands or gravels.

B. Soils having a moderate infiltration rate when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse texture.

C. Soils having a slow infiltration rate when thoroughly wetted and consisting chiefly of soils with a layer that impedes downward movement of water or soils with moderately fine to fine texture.

D. (High runoff potential). Soils having a very slow infiltration rate when thoroughly wetted and consisting chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material.

Map Unit Nn

This map unit is composed of Ninigret soils on 0-3 percent slopes. These soils are very deep and moderately well drained. Typically, they have a fine sandy loam surface layer 25 inches thick over sand and gravel to a depth of 60 inches or more.

The Ninigret soils are in hydrologic group B.

Map Units CrC and HpE

These map units are composed of two very different kinds of soils that are so intermingled on the ground that they cannot be separated on the map. Slopes are 3 to 15 percent. One soil named Charlton is very deep and well drained. It has fine sandy loam textures throughout its depth.

The other major component named Hollis is shallow and somewhat excessively drained. Typically it is fine sandy loam over hard schist bedrock at a depth of 10 to 20 inches.

These map units are in hydrologic group C.

VI. Planning and Engineering Considerations

The reported flooding problems within the study area appear to be caused by a number of factors. As Beaver Brook enters the property presently under consideration for flood control, there does not exist a well-defined channel. During times of high flow, the water enters a 24-inch culvert which ties into a 30-inch storm sewer in Plains Road. The 30-inch culvert carries excess flows east on Plains Road, south on West Rutland Road to Beaver Brook Road, where it is discharged back to an established Beaver Brook channel. Given the relatively flat topography of the subject property and the lack of a defined channel, during time of high runoff floodwaters within the area spread out over a large area for only a slight increase in elevation. The flooding is further aggravated by runoff from the northeastern area of the watershed. Based on topographic mapping supplied by the City and the field review, runoff from the northeastern area crosses West Rutland Road which has no storm sewers, and enters the subject property and residential area. As previously discussed, the construction of these homes and the establishment of the back yards appear to have somewhat altered the natural drainage patterns in this area inhibiting the southwestern flow to the culvert in Plains Road.

The City of Milford obtained, and provided for this review, flood damage estimates and narrative descriptions from two property owners within the residential area (#253 and #267 West Rutland Road). Based on this information, there is no evidence of overland flow entering the homes. There was clear evidence that flooding does occur on the properties causing documented damage to a swimming pool and increasing hydrostatic water pressure on one foundation resulting in water entering the basement.

The City of Milford has indicated an interest in providing flood protection to this residential area and is considering utilizing the ± 10-acre parcel of land north of

this area. The City is specifically interested in potentially developing a detention structure in this area.

Based on City topographic mapping, the elevation change between where Beaver Brook enters the subject property and the intake culvert to the storm sewer on Plains Road is less than two feet. This severely limits the flood storage available on the existing site. Any detention structure would have to be designed to store floodwaters below elevation 98 in order to not flood adjacent properties. In order to store flood waters to elevation 98, it would be necessary to construct an embankment parallel to Plains Road, tying into elevation 98 to the west and running north along the first residential lot, again tying into elevation 98. Under this scenario, less than five acre-feet of storage could be provided. For comparison, the detention basin immediately upstream presently under construction as part of the DiFranco subdivision will provide 15.60 acre-feet of storage.

The available flood storage at the site is further controlled by the invert elevations and capacities of the piping system into and within Plains Road. Flood storage can only be considered above the normal outlet elevation and therefore excavating the site to obtain additional storage area would entail lowering the elevations of the outlet into Plains Road. It could be feasible to excavate the area and create a permanent water body for recreation, wildlife, aesthetics, etc. The construction of any such detention structure would also require the construction of a defined channel and/or berm along the northern edge of the residential lots to contain runoff from the northeast.

In summary, there appears to be three basic alternatives available for construction of a detention basin in the subject area. One alternative would be to excavate the area and lower the invert elevation of the culvert under Plains Road. This alternative would offer the most storage capacity. A second alternative would be to construct an embankment detention basin to approximate elevation 98 on the site as previously discussed. This alternative would provide very limited storage capacity, but would be effective in mitigating flood damage from some of the smaller storm events. The third alternative would entail excavating the area, but leaving the culvert under Plains Road at its current elevation. This would likely provide a storage capacity somewhere between the other two alternatives, depending upon the water level maintained in the basin. Should alternative one or three be chosen, it would be desirable to monitor the ground water levels in the area via an observation well or wells on the site. It would also be desirable to observe water flows through Beaver Brook during the wet time of the year. Consideration should also be given to installing and maintaining a sediment trap if either alternative one or three is chosen. This will help maintain the permeability of the bottom of the basin. Construction of the diversion channel from West Rutland Road to the detention basin would be desirable under any of the three alternatives.

Any future flood control in the area should be subject to a detailed hydrologic and hydraulic analysis of the watershed. It should include an identification of flood hazard and development potential within the watershed. Based on this information, the City should establish project goals such as: provide protection from future runoff increases within the watershed; provide protection to downstream areas for existing runoff; provide protection to the residential area along Plains Road; and/or any combination of the above. As the residential area along Plains Road appears to be of immediate concern, the establishment of defined channels from north to south and from the northeast should be considered. Floodproofing individual structures and/or the construction of curtain drains around foundations to reduce hydrostatic pressures should also be considered.

If the City of Milford decides to pursue flood control in this area, the City should collect as much flood damage information as possible from the affected residents living on and below Plains Road. This information can be used in making application to the King's Mark Resource Conservation and Development Area Executive Committee for a flood control measure on Beaver Brook. Should an RC&D Flood Control Project be found not economically practicable, under Federal program guidelines, then application can be made to the Water Resources Unit of the Connecticut Department of Environmental Protection for a state/local cost shared flood control project.

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ABOUT THE TEAM

The King's Mark Environmental Review Team (ERT) is a group of environmental professionals drawn together from a variety of federal, state, and regional agencies. Specialists on the team include geologists, biologists, foresters, climatologists, soil scientists, landscape architects, recreation specialists, engineers, and planners. The ERT operates with state funding under the aegis of the King's Mark Resource Conservation and Development (RC&D) Area - a 47 town area in western Connecticut.

As a public service activity, the team is available to serve towns and developers within the King's Mark Area --- free of charge.

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 the review of a wide range of significant activities including subdivisions, sanitary landfills, commercial and industrical developments, and recreation/open space projects.

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 an administration agency such as planning and zoning, conservation, or inland wetlands. Requests for reviews should be directed to the Chairman of your local Soil and Water Conservation District. This request letter must include a summary of the proposed project, a location map of the project site, written permission from the landowner/developer allowing the team to enter the property for purposes of review, and a statement identifying the specific areas of concern the team should address. When this request is approved by the local Soil and Water Conservation District and the King's Mark RC&D Executive Committee, the team will undertake the review. At present, the ERT can undertake two reviews per month.

For additional information regarding the Environmental Review Team, please contact your local Soil Conservation District Office or Richard Lynn (868-7342), Environmental Review Team Coordinator, King's Mark RC&D Area, P.O. Box 30, Warren, Connecticut 06754.