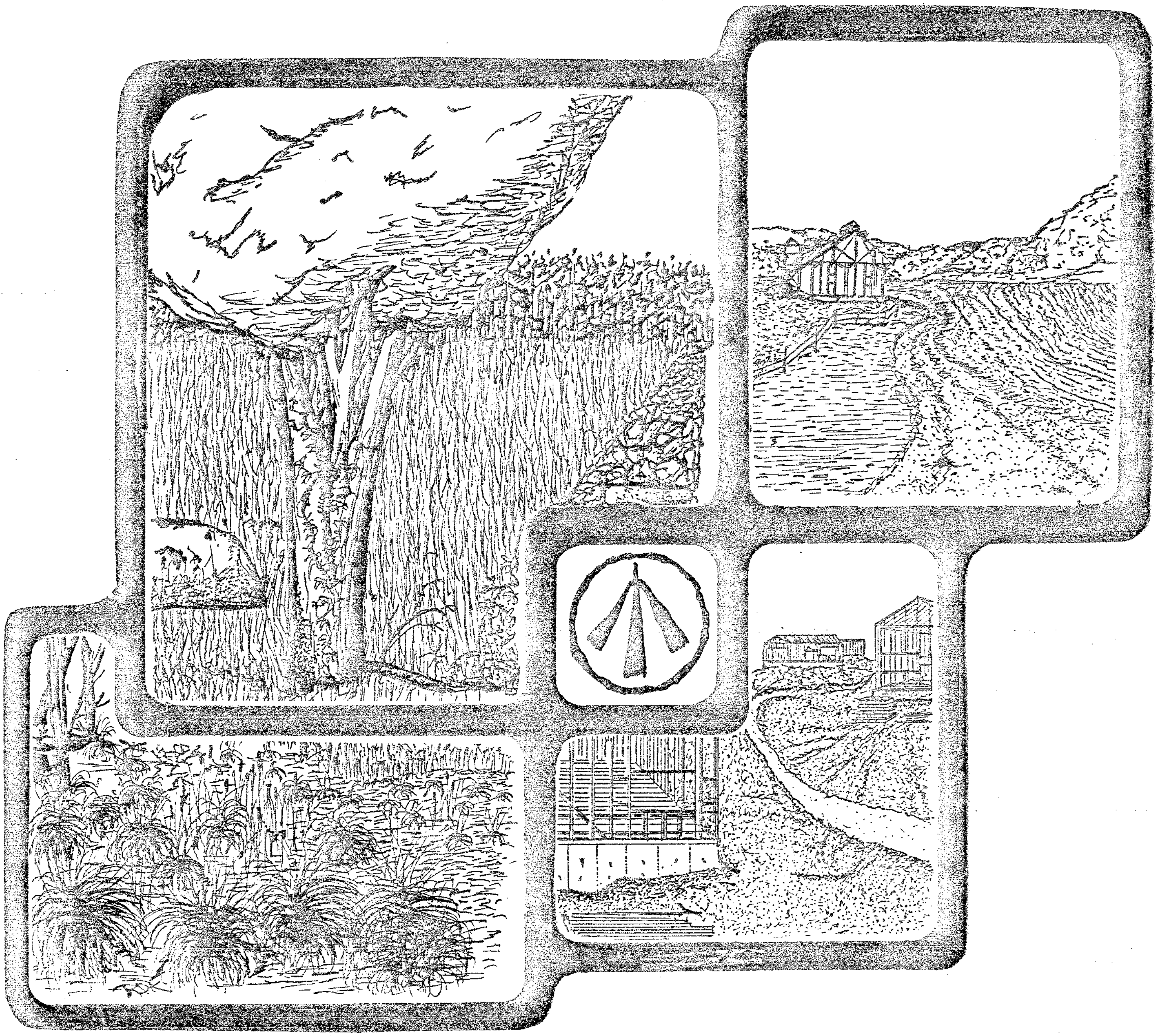
ENVIRONMENTAL REVIEW TEAM REPORT



WOODMONT / JUNIPER CONNECTION

Avon, Connecticut

KING'S MARK
RESOURCE CONSERVATION & DEVELOPMENT AREA

KING'S MARK
ENVIRONMENTAL REVIEW TEAM REPORT

WOODMONT/JUNIPER CONNECTION

Avon, Connecticut

JUNE, 1983

King's Mark Resource Conservation and Development Area
Environmental Review Team
Sackett Hill Road
Warren, Connecticut 06754

ACKNOWLEDGMENTS

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

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
Capitol Regional Council of Governments
American Indian Archaeological Institute
Housatonic Valley Association

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FUNDING PROVIDED BY
State of Connecticut

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Irene Nadig, Secretary

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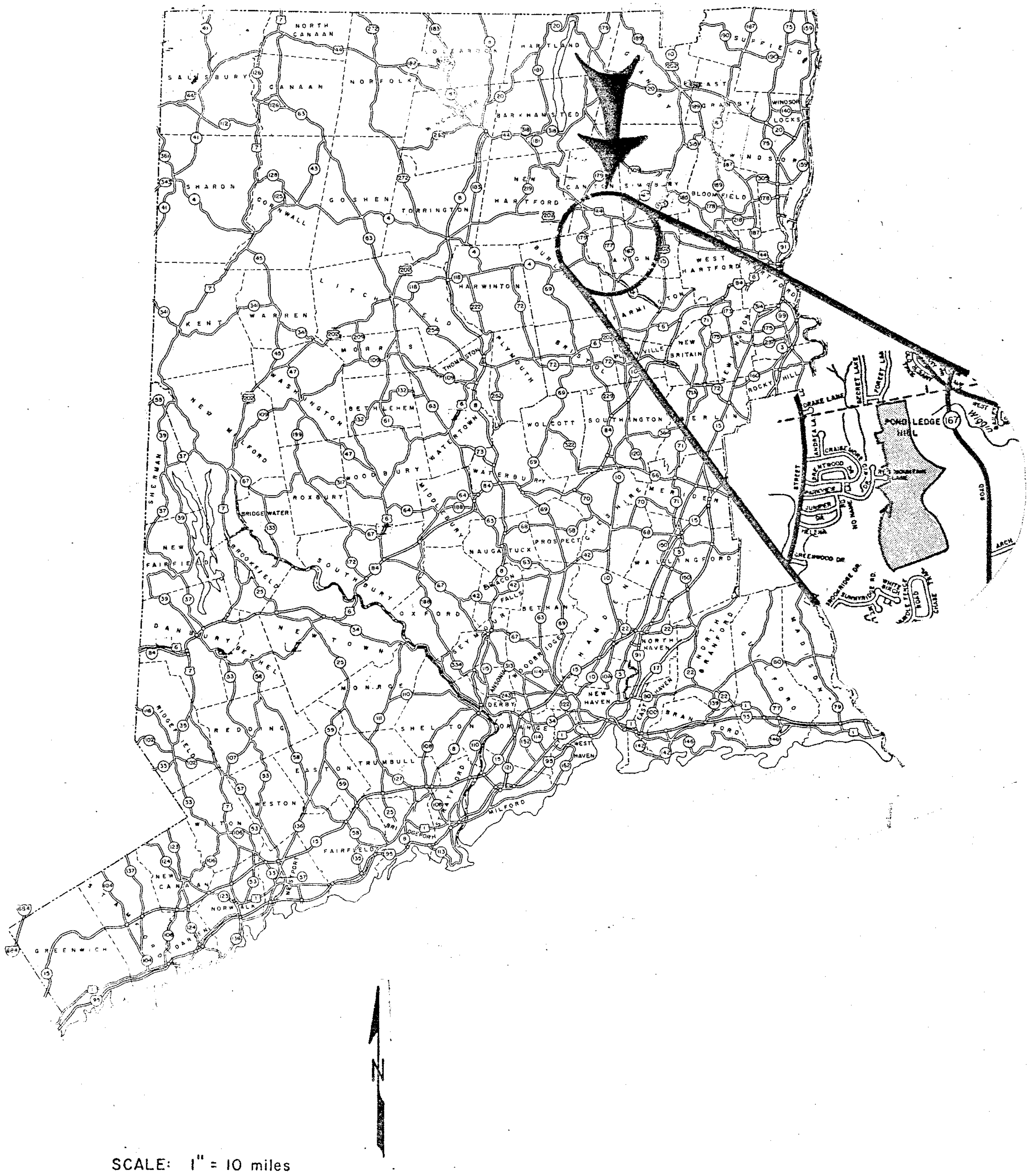


SCALE: 1" = 10 miles

10 0 5 10 miles

ENVIRONMENTAL REVIEW TEAM REPORT
ON
WOODMONT/JUNIPER CONNECTION
AVON, CT

I. INTRODUCTION

The Town of Avon is considering a proposed road which would entail the crossing of a wetland area in the northcentral portion of town. The crossing under consideration would connect Juniper Road to the west with Woodmont Avenue to the east. The Avon Planning and Zoning Commission believes a connector road through this area is necessary for public safety. The crossing would occur at a notch in Pond Ledge Hill and would traverse approximately 1000 linear feet of wetland soils (see Figure 1).

The Planning and Zoning Commission requested this Environmental Review Team study to assist them in understanding the natural resource characteristics of the wetland corridor where the road is proposed, and to become aware of the possible environmental impacts of a road crossing in the subject area.

As shown in Figure 1, the study area is ± 255 acres in size. The study area includes the drainage area of the central wetland and an additional ± 25 acres of the Pond Ledge area to the north. The additional Pond Ledge acreage was included due to the possible impact of the proposed road crossing on the recreational value of the Pond Ledge area.

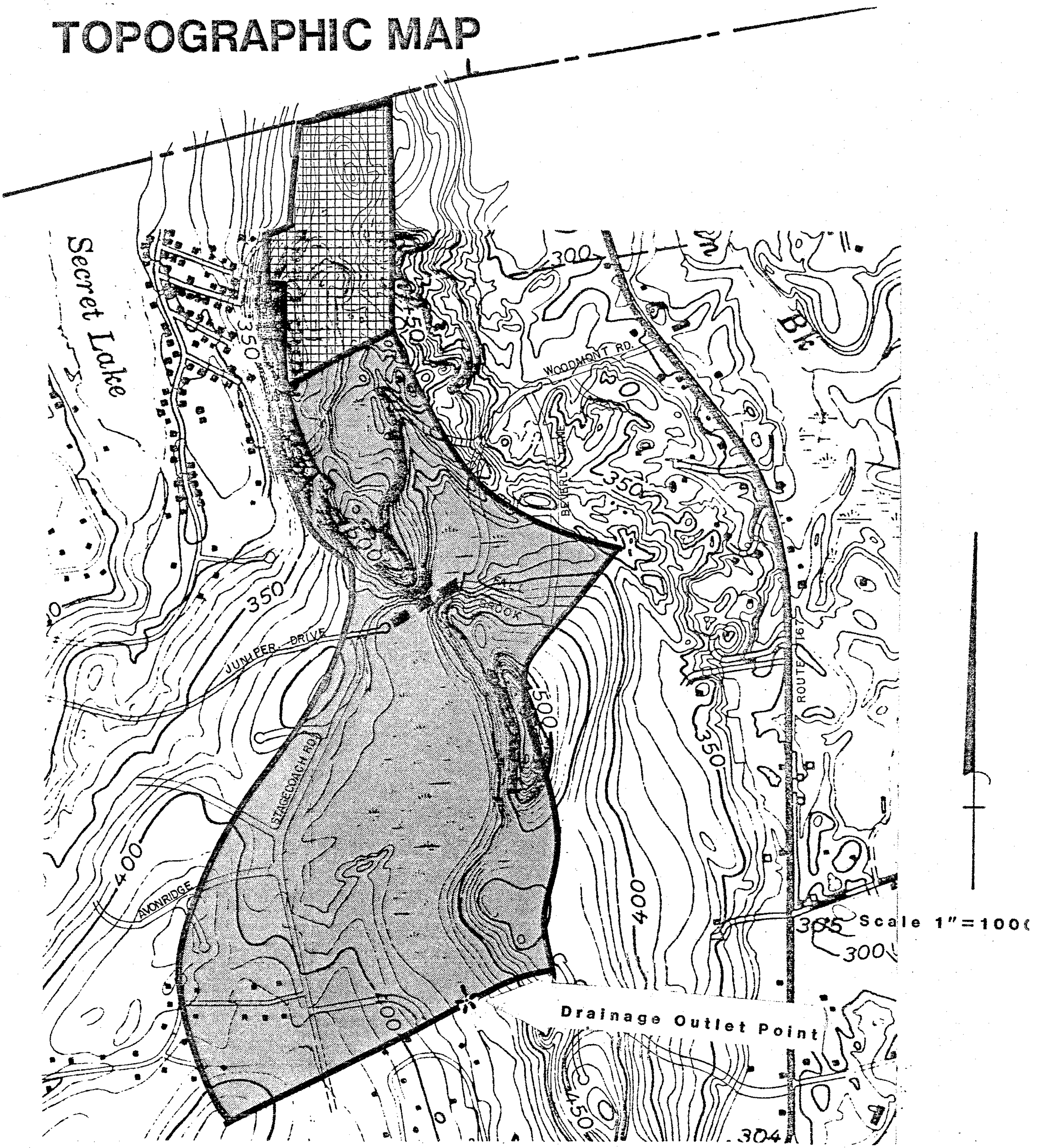
As shown in Figure 2, a portion of the study area has been developed for residential use. Much of the remaining area is owned by the Town of Avon or the State of Connecticut and is wooded.

The ERT met and field reviewed the area on March 29, 1983. Team members for this review included:

Rob Cochron............Soil Conservationist..........U.S.D.A. Soil Conservation Service
Joe Goyette............Environmental Planner.........Connecticut Dept. of Transportation
Ken Metzler............Ecologist.....................Connecticut Dept. of Environmental Protection
David Miller...........Climatologist.................UConn Cooperative Extension Service
Andy Petracco..........Recreation Specialist.........Connecticut Dept. of Environmental Protection
Bill Warzecha..........Geohydrologist................Connecticut Dept. of Environmental Protection

FIGURE 1

TOPOGRAPHIC MAP

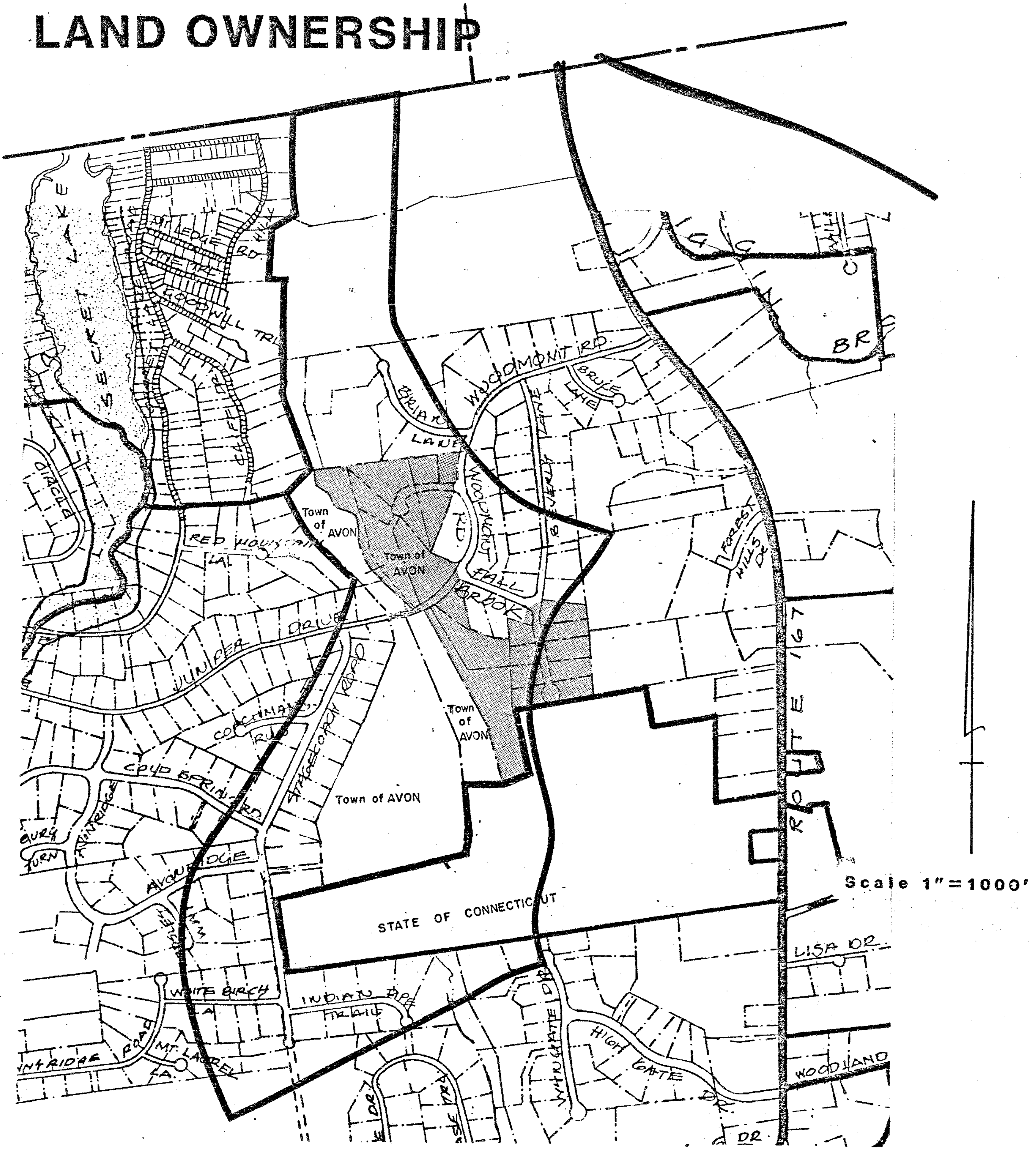


AREA OF PROPOSED ROAD CONNECTION

WETLAND WATERSHED

ADDITIONAL LAND IN STUDY AREA

FIGURE 2
LAND OWNERSHIP



FUTURE DEVELOPMENT SHOWN AS PROPOSED

Prior to the review day, each team member was provided with a summary of the proposed project, a checklist of concerns to address, a detailed soil survey map, a soils limitation chart and a topographic map of the area. The day of the field review, the ERT met with representatives from the Town of Avon and investigated the study area. 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 and recommendations. It is important to understand that the ERT is not in competition with private consultants, and hence does not perform design work or provide detailed solutions to development problems. Nor does the team recommend what ultimate action should be taken on a proposed project. The ERT concept provides for the presentation of natural resources information and preliminary development considerations--all conclusions and final decisions rest with the town. It is hoped the information contained in this report will assist the Town of Avon in making environmentally sound decisions.

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

* * * * *

II. HIGHLIGHTS

1. *In the opinion of the Team's geologist, a road could be constructed through the wetlands without significant hydrologic damage provided a properly engineered plan is designed and followed. Special attention should be directed to areas such as: 1) proper sizing and installation of equalizer pipes, 2) protecting the existing streamflow through the wetland, perhaps through the installation of a short bridge section, 3) proper placement of fill material in the area of the proposed road embankment, and 4) properly estimating and handling surface runoff created by the road. (pg. 10)*

2. *The wetland serves as a stormwater detention area, reducing peak flows in Chidsey Brook and limiting the potential flood damage that may occur along the brook. Construction of the proposed road will affect this function by 1) eliminating a portion of the wetland's storage area where the road is constructed, and 2) increasing runoff volumes and peak flows in the area. While the percentage increase in runoff volumes and peakflows is not expected to be significant, proper erosion and sedimentation control measures should be implemented to mitigate potential problem areas. The loss of a portion of the wetlands storage area is also not expected to be significant providing water movement through the road embankment is properly planned and pre-construction water levels are maintained. (pg. 12)*

3. *In order of lowest cost to highest, some of the methods of crossing a wetland are: 1) filling on a mat, 2) filling by displacement, 3) replacing unsuitable material, 4) bridging. Without an indepth engineering study and cost comparison it is difficult to select the best method for the Woodmont/Juniper connection. In the opinion of the ERT's environmental planner, however, a partial excavation, displacement fill, and a bridge at the stream appears to be the most reasonable alternative for crossing the area at this time. (pg. 13-15)*

4. *Implementation of the project should include a comprehensive plan for the control of erosion and sedimentation. (pg. 16)*

5. *Roadway salting and traffic related pollutants will increase with implementation of the project in this area. However, in the opinion of the Team's Environmental Planner, the project will not cause a significant chemical deterioration of the area any more than do the existing roads in the area. (pg. 17)*

6. *If the proposed road is properly designed and constructed, there should be no problem with frost heaves. A number of engineering techniques are available to break the capillary action which can result in the frost heaving of a road. These include plastic water barriers, underdrains, various mats, and porous fill material. (pg. 17)*

7. *The ridge system and adjoining wetland provides a diversity of habitats which are of great value to wildlife. A number of rare plants and animals can be found within this wetland and ridge system. The project will adversely affect wildlife habitat both directly and indirectly. Construction of the road will result in direct habitat loss through elimination of a portion of the wetland. Wildlife habitat will also be more indirectly affected by the increased human presence in the area. The increased traffic and associated noise will render the immediate project vicinity unsuitable for some of the more shy species of wildlife. (pg. 20)*

8. *To minimize the adverse impacts of the project on wildlife, the following should be considered: a) install a short span of bridge over the intermittent stream area of the crossing. This will provide at least one area where wildlife can cross the notch area without crossing the road. b) If guard rails are used on the road, require that a minimum 12" space be left between the ground surface and the bottom of the railing. This will allow those wildlife wishing to cross the road the opportunity. (pg. 21)*

9. *The proposed roadway will not have a significant effect on the general climate or microclimate of the area. Local air pollution loads will be increased, however, due to traffic through a wind protected area. It should be noted that the increase in air pollution in this area will more than be offset by reduction of air pollution on Country Club Road due to decreased traffic. Therefore, the net effect will probably be to reduce the general area air pollution concentration. (pg. 22)*

10. *Road noise will also be increased due to increased traffic. It is anticipated that the elevated noise levels will be offensive to the surrounding neighborhood and will also adversely impact wildlife populations. (pg. 22)*

11. *Construction of the connector road itself will enhance access to the ridge area and its amenities. On the other hand, the road will diminish the open space value of the area, at least in the immediate vicinity of the road. With construction of the road, the "wilderness experience" presently offered by the area will be diminished. (pg. 24)*

12. *A review of existing land use and topography in the area indicates that the Woodmont/Juniper connection is the most logical route if a connector road is to be constructed within the study area. (pg. 25)*

13. *A "no build" alternative would clearly better protect the character of the wetland system and its associated ridges than the construction of any road. Whether or not the road should be built, however, is properly a decision for the Town of Avon to make after thoughtful consideration of environmental, economic and public safety issues. (pg. 25)*

* * * * *

III. TOPOGRAPHY AND GEOLOGY

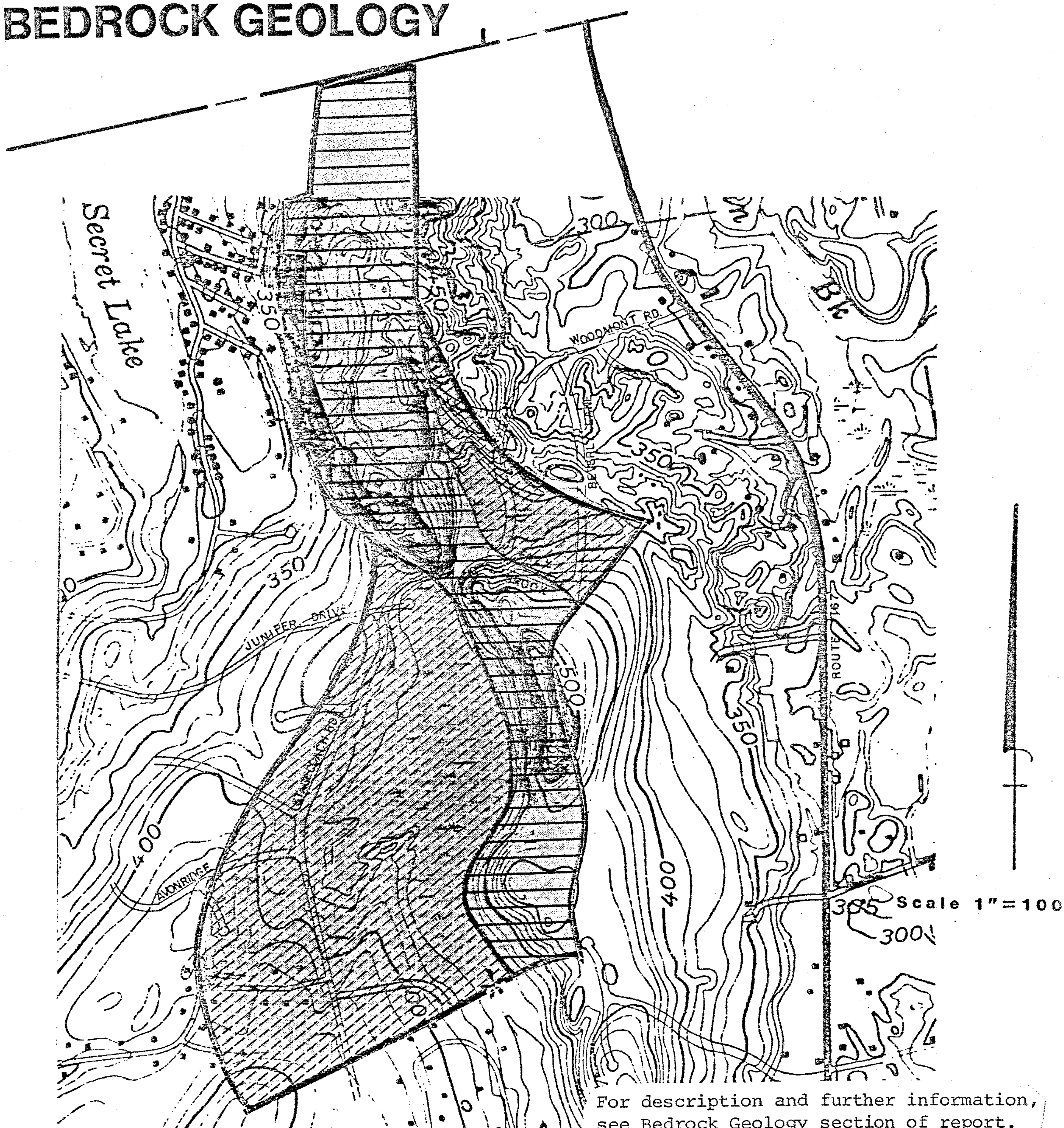
The proposed Woodmont Road/Juniper Drive Connection is located in a section of Avon which is included in the Avon topographic quadrangle. A small area in the western section of the study site is located in the Collinsville quadrangle. The bedrock and surficial geologic maps of the Avon quadrangle, by Robert W. Schaabel (maps GQ-134 and GQ-147, respectively) have been published by the U.S. Geological Survey. The bedrock geologic map (QR-16) of the Collinsville quadrangle has been prepared by Rolfe S. Stanley and also published by the U.S. Geological Survey. However, the surficial geologic map of the Collinsville quadrangle has not been prepared to date but is on open file and available for review purposes at the Natural Resources Center, Department of Environmental Protection in Hartford.

The proposed road connection would be located in a notched area which cuts through Pond Ledge Hill. The notch separates two very prominent ridges that run north-south through the middle section of the study site. Elevations of the site, as taken from the published Avon and Collinsville topographic maps, range between 500 and 550 feet above mean sea level. The ridges have steep west facing scarps (cliffs formed by faulting), more gentle east slopes, and a flat topped summit which affords visitors a very scenic view to the south and west. Numerous outcrops are exposed along the top and scarps of the ridges. The rock unit that make up the ridges has been classified as diabase. "Diabase" may be described as a dense, medium to dark grey rock formed by the cooling of volcanic liquids. It should be noted that the diabase ridges of Pond Hill Mountain were emplaced during the same period of igneous (rocks formed by the solidification of a magma) activity that produced Talcott Mountain to the east. Diabase has been mined as a source of building stone, crushed rock (traprock) and rip-rap.

Another rock unit underlying the study site east and west of the diabase ridges is a sedimentary rock (rocks formed near the earth's surface in layers) unit called New Haven Arkose. New Haven Arkose consists of interbedded conglomeratic arkose (a sandstone with scattered pebbles and a high percent of the mineral feldspar) and arkosic (feldspar-rich) siltstone. This rock unit was formed by the cementation of sand, silt and pebbles that were deposited in streams and lakes approximately 200 million years ago.

The town has expressed a concern with regard to cutting into either side of the steeply sloped land which flanks the proposed road connection by blasting. This is being considered as an option so that the connection could be shifted further away from the wetland area. Blasting of the diabase rock unit in this area could probably be done provided that geological engineering design is fully considered. Of major importance would be the determination of what defects (i.e. jointing, fractures) are in the rock unit. This research should be done by an engineering geologist familiar with road cuts and blasting. Once this information is compiled, the engineer/geologist should be able to determine such factors as: 1) how susceptible the rock unit is to sliding and 2) how steep or flat the cut into bedrock should be.

FIGURE 3
BEDROCK GEOLOGY



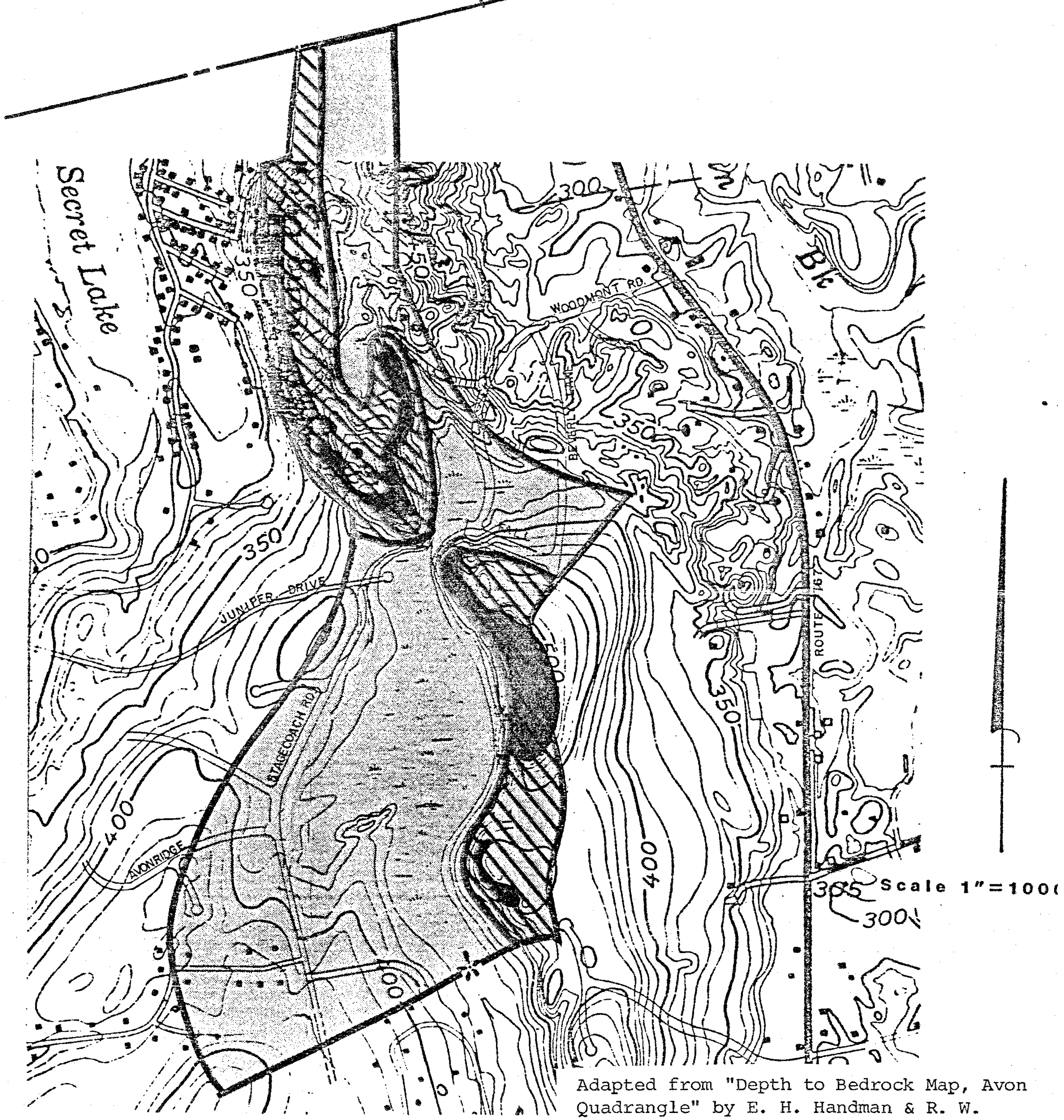
For description and further information, see Bedrock Geology section of report.

LEGEND

DIABASE

PORTLAND ARKOSE

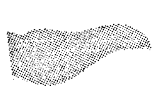
FIGURE 4
DEPTH TO BEDROCK



Adapted from "Depth to Bedrock Map, Avon Quadrangle" by E. H. Handman & R. W. Schnabel (1973)

LEGEND

Bedrock outcrops - ruled pattern indicates areas that are shallow to bedrock (0 - 10')



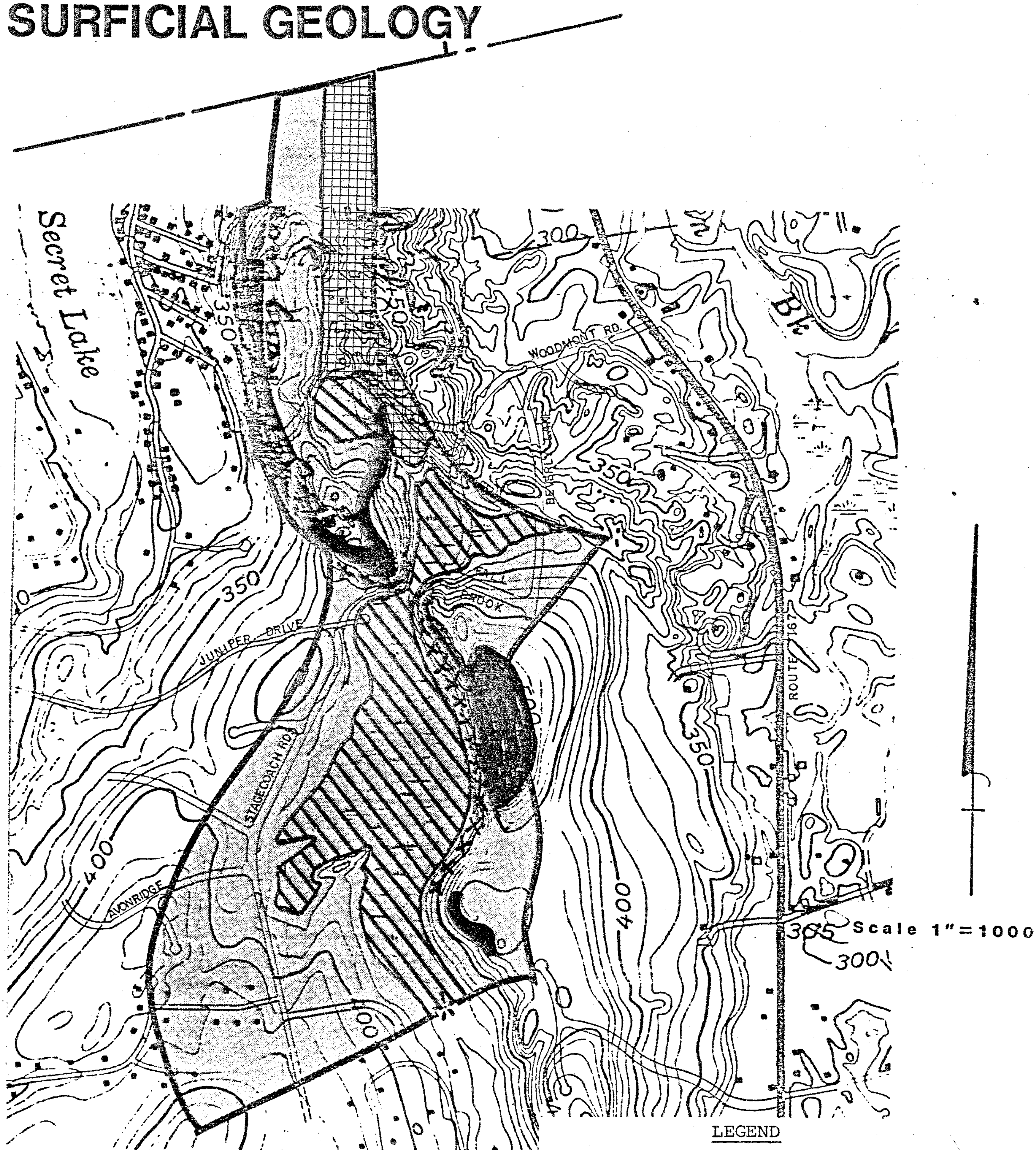
10 - 50'

It should be noted that the team geologist spoke with a Connecticut DOT official who states that bedrock sliding in the rock unit diabase has occurred along road cuts on Route 44 in Avon. It appeared at the time of the review that a 1:1 slope exists in the area where cutting/blasting would occur. Given this slope, a considerable vertical cut (up to 60-70 feet) might be required to locate a portion of the road in this area. If a vertical cut is made into the slope, creation of a buffer area to collect falling rocks and talus will be important to prevent rocks from rolling or sliding onto the road. A buffer zone of approximately 20-25 feet between the bottom of the cut and the travel way of the road would be required to ensure protection from sliding and falling rock. Clearly, the road could be constructed at a much lesser expense if cutting/blasting into the sloped areas was avoided. In the opinion of the Team's geologist, a road could be constructed through the wetlands without significant hydrologic damage provided a properly engineered plan is designed and followed. Special attention should be directed to areas such as: 1) proper sizing and installation of equalizer pipes, 2) protecting the existing streamflow through the wetland, perhaps through the installation of a short bridge section, 3) proper placement of fill material in the area of the proposed road embankment, and 4) properly estimating and handling surface runoff created by the road. With construction of the proposed road, it is recommended that a 20-25 foot buffer zone between the toe of the bedrock slope and where fill for the proposed road begins be maintained. This should ensure protection of the road users from falling or sliding rock.

Most of the subject site is covered by till, a nonsorted sediment deposited directly from the glacier. "Till" contains rock particles that range in size from clay to huge boulders. Although the thickness of till may vary throughout the state, it is probably less than 10 feet thick where it covers the site. Based on visual inspection and soil maps, sand and gravel deposits cover bedrock in the western and northeastern sections of the study site. These materials are part of a Kame terrace. A "Kame terrace" is a glacial sediment that was deposited by meltwater streams flowing between glacier ice and an adjacent valley wall. The thickness of these deposits is probably about 10 feet.

Two other types of surficial deposits found within the study site are swamp deposits and talus. Both of these deposits are post-glacial as they were formed after the melting of the glacial ice. Swamp deposits are found throughout the ± 60 acre wetland which extends from the middle to southern section of the site. It should be noted the proposed road connection will traverse a small section of this wetland. Swamp deposits are composed of differing amounts of sand, silt and clay intermixed with decomposed organic material which is generally less than 10 feet thick. The swamp deposits are usually underlain by fine bluish-gray stratified sand and silt as much as three feet thick, which is in turn underlain by till or stratified drift. "Talus" is defined as angular rock fragments ranging in size from a few inches to several feet in diameter. These rock have broken loose and fallen from the exposed bedrock and overhanging cliffs by colluvial (moved downslope by gravity) action. As a result, the talus accumulates in piles along the base of the bedrock slope. Talus deposits are most abundant on the west side of the ridges.

FIGURE 5
SURFICIAL GEOLOGY



LEGEND

KAME TERRACE DEPOSITS

SWAMP DEPOSITS

TILL DEPOSITS

BEDROCK OUTCROPS

TALUS (Sliderock)

For description and additional information see <u>Surficial Geology</u> Section of report.

IV. HYDROLOGY

The site lies within the upper reaches of the Chidsey Brook watershed. This watershed covers an area of approximately 2.18 square miles (± 1,400 acres). Chidsey Brook originates in the wetland area within the site reviewed, then flows in a southerly direction until it joins Thompson Brook. Ultimately, runoff accumulating within the watershed drains into the Farmington River.

By definition, the watershed of Chidsey Brook comprises all land areas from which water drains into the brook. A raindrop falling on the watershed boundary would have a 50 percent chance of passing into or out of the watershed. As shown on the topographic base map, the watershed boundary or drainage divide tends to follow the crests of local hills and ridges, i.e., Pond Hill Ridge, etc. Precipitation is either shed quickly across the surface, retained temporarily by vegetation, or absorbed into the soil. Part of the absorbed water is utilized by plants, part is evaporated from the soil, and part percolates down to the water table. Water in the zone of saturation moves slowly down slope and ultimately re-emerges at the surface in the form of springs or streams.

At the present time, there is no gaging station within the watershed or on Chidsey Brook. Nevertheless, it is possible to estimate the outflow from the watershed based on a method that uses long term stream flow records for a standard 30-year reference period. The reference source is: "Streamflow Information for Connecticut with Application to Land Use Planning" by Michael A. Cervione, Jr., U.S. Geological Survey, 1982. Based on this method, an estimated 3.6 cfs (cubic feet per second) or 2.3 mgd (million gallons per day) would flow out of the watershed. It should be noted that this estimate may be high, since water stored in the large wetlands within the watershed is removed by evapotranspiration to the atmosphere.

The proposed 1,000 foot road connection will cross a small portion of the wetland, which presently serves several hydrologic functions. First, it serves as a stormwater detention area, reducing peak flows in Chidsey Brook and limiting the potential flood damage that may occur along the brook. Construction of the proposed road will affect this function by 1) eliminating a portion of the wetland's storage area where the road is constructed, and 2) increasing runoff volumes and peak flows in the area. While the percentage increase in runoff volumes and peakflows is not expected to be significant, proper erosion and sedimentation control measures should be implemented to mitigate potential problem areas. The loss of a portion of the wetlands storage area is also not expected to be significant providing water movement through the road embankment is properly planned and pre-construction water levels are maintained.

Another hydrologic function served by the wetland is the purification of surface waters. Runoff generated by the road is likely to be contaminated with de-icing compounds (road salt) during winter months, plus oils, automobile residue, etc. The wetland may remove some of these contaminants from runoff although it is unlikely that they could completely remove them. These contaminants do, therefore, represent a potential threat to water quality and the wetlands and can reduce the effectiveness of the wetland as a natural buffer. It appears that the road crossing would be relatively level, and therefore, require lesser amounts of road salt and sand. Nevertheless, should the road be built, it is recommended that the town consider minimizing the use of road salt and sand in this area.

There does not appear to be any substantial high-yielding groundwater source within the study site. Usually, the most productive aquifers are thick, coarse grained stratified drift deposits. Consequently, any well or wells in this area would have to tap fractures in the underlying bedrock. As discussed earlier in the bedrock geology section, two distinct types of bedrock underlie the site: 1) sedimentary (New Haven Arkose) and 2) igneous (diabase). Sedimentary rock units may be capable of supplying water to individual wells in quantities adequate for large scale uses (i.e. up to 300 gpm). In comparison, igneous rocks are generally capable of yielding 1-100 gpm, enough water only for individual wells or domestic and light commercial use. A survey of wells in the Upper Connecticut River Basin, an area whose geology is similar in many respects to that of Avon, indicated that the yield of 21 wells tapping basalt (diabase is a type of basalt) ranged from 3 to 125 gallons per minute and averaged 19 gallons per minute. However, at some places in the Upper Connecticut River Basin, wells have had to be drilled entirely through the basalt layer and into underlying sedimentary bedrock in order to obtain adequate yields. (Source: Water Resources Bulletin No. 24 - Part 7). Based on hydrogeologic data from the Farmington River Basin, which has not been published to date, bedrock based wells tapping sedimentary rock in the vicinity of the study site revealed yields of 15 and 25 gpm at depths of 148 feet and 297 feet, respectively. (Source: Water Resources Bulletin No. 28).

V. SOILS AND ROADWAY CONSTRUCTION

A. Soil Descriptions

As shown in Figure 6, the proposed road crossing would primarily cross soils mapped as Peats and Mucks (PKA). Depending upon roadway design , a portion of the ridge area, mapped as RKE (Rocky Land), may also have to be disturbed.

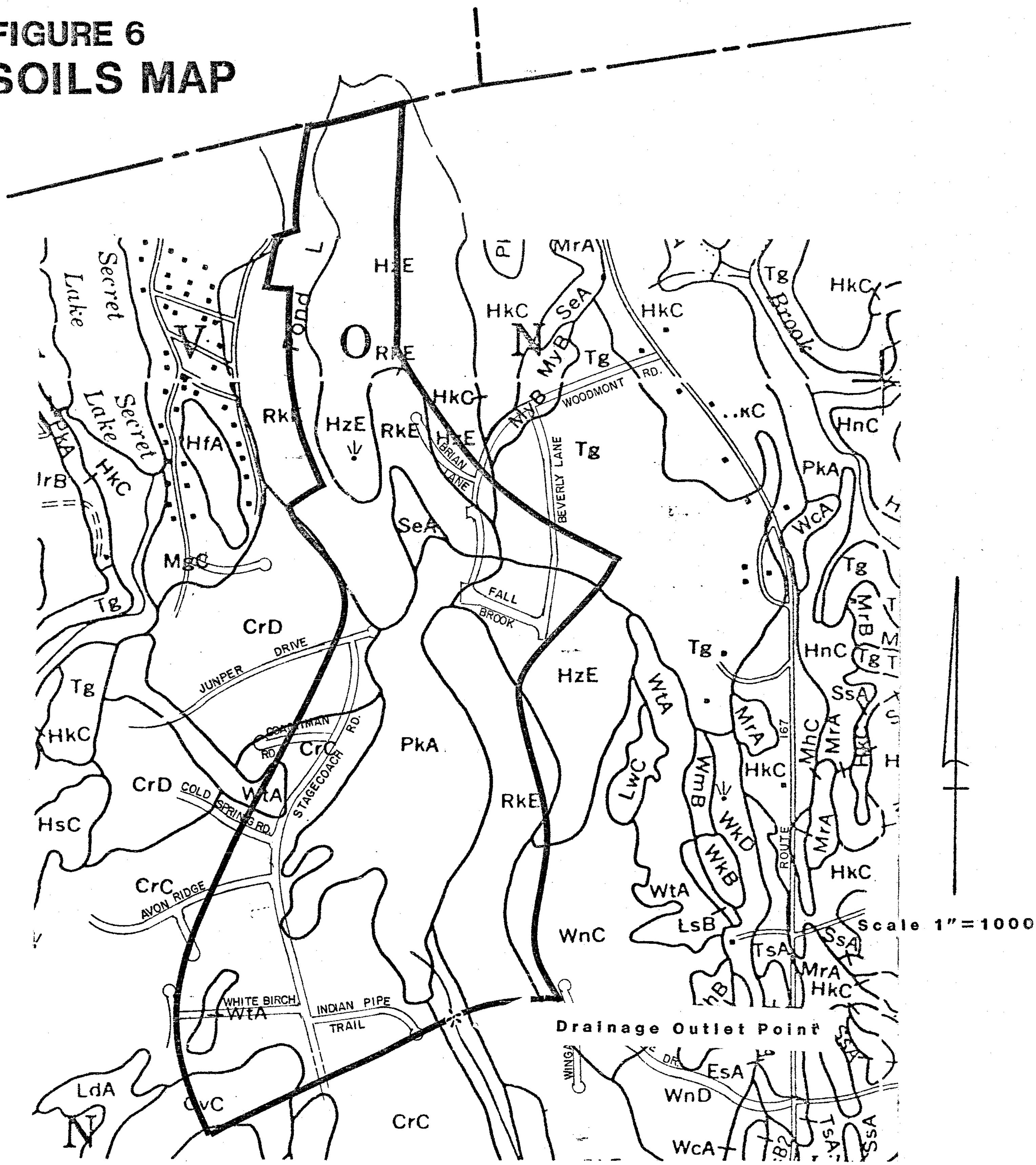
Peat and Muck soils have a high water table during most of the year and water ponds on the surface in winter and spring. Surface organic deposits in these soils may range from 1½ feet to more than 20 feet in thickness. Boring data submitted by Henry Moeller, Soil Scientist, and town data indicates that the depth of muck material in the Woodmont/Juniper area exceeds 100 inches in several areas. Because of this unstable wet organic material, the development of this area for roadway use will be very costly . Within the area of the proposed roadway construction, the present ecosystem will be destroyed. This ecosystem presently provides a valuable habitat for wetland wildlife as discussed in a later section of this report.

The Rocky Land soils (RkE) in the subject area are characterized by bedrock exposure and steep ledges. These soils also present severe limitations for roadways due to steep slopes and shallow to bedrock conditions. Blasting would be required to locate any portion of the roadway in this area.

B. Roadway Construction

In order of lowest cost to highest, some of the methods of crossing a wetland are: 1) filling on a mat, 2) filling by displacement, 3) replacing unsuitable material, 4) bridging. Each of these methods will be briefly described.

FIGURE 6
SOILS MAP



Adapted from Hartford County
Soil Survey, U.S.D.A.-S.C.S.

1) Filling on a mat. The placement of a mat on unsuitable material is not a new concept. Years ago logs were used to support or "float" roadway embankments. Today, synthetic engineering fabric is used. Design of a fabric mat requires a knowledgeable engineer. Some manufacturers do provide assistance in proper design and construction. Impacts from this technique could be a limited mud wave and possible alteration of groundwater and surface water flow.

A mud wave results from the displacement of muck material beneath the roadway. Essentially the muck material is squeezed down and to the sides of the roadway as fill material is added. This displacement of muck can result in elevating the area immediately adjacent to the roadway. This elevation of material can affect surface drainage, increase the depth to the water table, affect subsurface drainage, and impact local flora by making the affected area less wet.

2) Filling by displacement. This method simply involves backfilling the swamp until a stable base is obtained. A variation of this is the partial removal of unsuitable material, perhaps with a drag line, and then filling.

Impacts could include a mud wave as discussed above and the interruption of subsurface flows. As with the previous alterative, the seriousness and magnitude of these impacts without a complete engineering study are difficult to predict.

3) Replacing unsuitable material. This method entails the complete removal of unsuitable material down to a stable base and then backfilling with a suitable material. Due to the large amount of earth excavation and filling, this alternative would be very costly and might prove to be the most damaging from an environmental standpoint without proper controls (e.g. sheet piling to prevent the roadbed trench from caving in. On the other hand, this alternative probably would result in a better (i.e. more stable) road in the long run than the previous two alternatives. In considering this alternative, much depends on the stability of the subsurface material. According to the boring log for this area, bedrock was never reached. So it is unknown how deep the removal of muck would have to go for complete stability. Assuming a roadway 1,000 feet long and 32 feet wide, with an average trench depth of 10 feet, and 2:1 side slopes, over 30,000 cubic yards of material would have to be removed. This material would have to be transported to a disposal site and the excavated area backfilled with an equivalent amount of fill for a subgrade.

Impacts associated with this method include construction impacts (e.g. muddy water, equipment leaking oil, tracking of mud onto local streets, chemically active rock or gravel fill,* smell from excavation). Other impacts include the need to get rid of the unsuitable material and the disturbance of another area to provide the fill. The maintenance of existing water flow through the area is another concern.

With all the embankment roadway options, a means would have to be provided to pass the stream in the swamp. Culverts would hinder the natural movement of some fauna if not stopping it altogether. At least in this stream portion of the proposed crossing, a bridge should be considered. There are a number of short-span bridges on the market which could be installed without significantly disturbing the streambed or streambank.

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*Some materials leach iron or sulfur or both. The Ph of the water can change as well as the appearance.

4) Bridging. The bridging of the entire road over the swamp would likely prove too expensive to be feasible. It should be noted, however, that depending upon the type and quality of construction, installation of a bridge through this area might have a greater or lesser impact on the area than the preceeding alternatives. If pilings are carefully installed and the bridge constructed in sections from one side to the other, the impact would likely be less. If, however, fill material is necessary in order to gain access to the area for construction, impacts in the long and short run could be greater.

Without an indepth engineering study and cost comparison it is difficult to select the best method for the Woodmont/Juniper connection. In the opinion of the ERT's environmental planner, however, a partial excavation, displacement fill, and a bridge at the stream appears to be the most reasonable alternative for crossing the area at this time.

C. Road Related Pollutants

1. Erosion and Sedimentation. Erosion and sedimentation should be a concern both during and after construction of the roadway. Without proper controls, turbid water and sediment accumulation in the wetland will occur. This can, in turn, adversely affect local flora and fauna.

Implementation of the project should include a comprehensive plan for the control of erosion and sedimentation. The emphasis of this plan should be on keeping the sediment on-site to prevent the occurrence of off-site damages. Specific controls will depend upon roadway design, but should include sediment detention basins, haybale checks and/or sediment filters, temporary and permanent vegetation, energy dissipators and rip-rapped stormwater outlets. The installation and proper maintenance of sumps in the road drainage system will mitigate the washing of road sand into the wetland area. A number of publications are available from the U.S.D.A. Soil Conservation Service office in Windsor which can provide guidance in developing an erosion and sediment control plan for the area. Staff from the SCS office in Windsor is also available to assist in the preparation or review of an erosion and sediment control plan for the project.

The most critical time with regard to erosion and sedimentation control would be during project construction. If construction is limited to the dry time of the year, and erosion and sediment control measures are properly applied, erosion and sedimentation will be kept to a minimum and the wetland system should not be significantly impacted by the project.

2. Road Related Pollutants. Wetlands are known as "nature's filters" and can contain, absorb and neutralize many pollutants. It is difficult, however, to assess the concentration and impact of traffic generated pollutants from a roadway such as the one proposed.

Research on this matter prepared by the Town of Avon using a model prepared by the "Center for the Environment and Man" indicates: 1) the total amount of pollutants generated with construction of the road would be less than that generated at the present time due to shorter travel distances, and 2) lead is the only pollutant of those considered which might exceed health standards for potable water at storm drainage discharge points for the road. Those pollutants considered in the above analysis included lead, nitrogen, phosphorus, copper, chromium, nickel, zinc, and biological oxygen demand. It should be noted that with the exception of lead, most roadway pollutants are subject to air movement and may not be deposited in the wetland.

According to town data, an average of 68 tons of a 9% salt/91% sand mixture is applied per road mile per winter on town roads. This application rate is equivalent to 5.6 cubic yards of salt and 47.7 cubic yards of sand. This application rate would result in 6 tons of salt per mile or 1.2 tons of salt for a 1,000 foot section of roadway per year. The literature shows that road salting may adversely affect small streams and plants.[1] Grasses are least affected by road salt while many species of evergreen and deciduous trees are extremely susceptible, including sugar and red maple, shagbark hickory, American Elm, speckled alder, hemlock and white pine. Tolerant species include red and white oak, red cedar, birch, black cherry, and white ash. Young trees are usually more susceptible than the older ones. Light to moderate salting, as is the norm in the Town of Avon, can be expected to produce a small but noticeable decline in vegetation in the immediate area of the roadway.

To conclude, roadway salting and traffic related pollutants will increase with implementation of the project in this area. However, in the opinion of the Team's Environmental Planner, the project will not cause a significant chemical deterioration of the area any more than do the existing roads in the area.

D. Additional Considerations

If the road is built in the area, careful thought should be given to protecting the existing water line. Fill could cause movement of the line and possible damage to local flora and fauna.

Material needed for road fill could probably be excavated from the adjacent rock ridges. If this is necessary, great care should be taken to ensure that cuts are done in an aesthetical way. The rock would also have to be checked for suitability (chemical and mechanical) prior to its use for fill material.

If the proposed road is properly designed and constructed, there should be no problem with frost heaves. A number of engineering techniques are available to break the capillary action which can result in the frost heaving of a road. These include plastic water barriers, underdrains, various mats, and porous fill material.

In concluding this section of the report, the Team wishes to mention that other activities occurring within the wetland watershed as shown in Figure 1 are impacting the wetland corridor to one extent or another. Many of the concerns addressed in this report with regard to the connector road are already occurring from area construction activity and existing road stormwater outlets. Of particular concern is the construction activity to the east of the proposed connection. The day of the ERT's field review, considerable sediment was observed in the middle wetland basin of the study area emanating from a recently constructed road across the wetland area. Few erosion and sediment controls were observed. In the opinion of the Team's Soil Conservationist, the same

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[1] "Designing A Lake Management Program" by Metropolitan Area Planning Council, Boston, MA, 1979.

level of scrutiny being directed at the proposed connector road should rightly be directed towards other activities proposed or being constructed within the wetland watershed.

VI. BIOLOGICAL CONSIDERATIONS

A. Biological Characteristics

The biological characteristics of the area surrounding the proposed "Woodmont/ Juniper Connection" are tied closely to the landscape. The surrounding area can be separated into two distinct features: the ridge system and the large wetland system. Each of these landscapes is distinct with a different vegetation, hydrology, land-use and response to the impacts from development. The salient features of the two landscapes are described below.

THE RIDGE SYSTEM

The ridge in the project area is the southern extension of a larger discontinuous system that includes Onion Mountain, the Sugarloaf, the Hedgehog, Barndoor Hills, and Manitook Mountain to the north. The ridge system dominates the landscape with its erosion resistent core protruding high above the surrounding land. The west facing cliffs, ledges, and talus slopes provide a marked contrast to the low, rolling hills of the surrounding area. The project area is dominated by two sections of the ridge; Pond Ledge Hill to the north and an unnamed segment to the south. Separating the two ridges is a notch where the "Woodmont/Juniper Connection" is proposed.

The ridge system is composed of erosion resistant diabase (trap-rock) which projects several hundred feet above the valley lowland. It's exposed flat-topped summits, high precipitous cliffs, and extensive talus slopes provide unique habitats which support an interesting flora and fauna as well as a number of rare plants and animals. The ridge is forested throughout much of its range creating a continuous greenbelt and a biological corridor for migratory and transient animal species. The major use of the ridge is for recreation with a number of trails running along the ridge line that offer a number of scenic views to the ambitious hiker. Presently, the threat of residential development on the east threatens the natural integrity of this ridge.

From east to west, the typical traprock ridge has a gentle slope following the tilted surface of the rock, an exposed ridge line with shallow soil, a steep rocky cliff with scattered ledges, and a talus slope built up from boulders and rocks broken off from the cliff.

Each of the topographic components has its own association of plants and animals. At the base of the eastern slope often grows a rich forest dominated by Sugar Maple (Acer saccharum) and White Ash (Fraxinus pensylvanica) with a number of interesting species such as Wild Ginger (Asarum canadense), Blue Cohosh (Caulophyllum thalictrodes), Trillium (Trillium erectum), and many other spring wildflowers.

Further up the slope the forest is drier and composed of mixed oaks (Quercus spp.), hickories (Carya spp.), and hemlocks (Tsuga canadensis) with maple-leaved viburnum (Viburnum acerifolium), mountain laurel (kalmia latifolia), blueberries (Vaccinium angustifolium, V. vacillans), and/or huckleberry (Gaylussacia frondosa) as common shrubs. In shallow soil on the summits often grows a white ash and hickory forest and on the ledges an open cover of stunted red cedar (Juniperus virginiana) and bear oak (Quercus ilicifolia). Also on the ledges grow grasses such as little bluestem (Schizachrium scoparius) and poverty grass (Aristida dichotoma, Danthonia spicata), and herbs such as silver-rod (Solidago bicolor), stiff-leaved aster (Aster linarifolius), rock-cress (Arabis laevigata), and many sedges (Carex arctifecta, C. Convoluta, Carex spp).

The cliffs are virtually devoid of vegetation with occasional oaks, hemlock, or red cedar clinging to the cracks in the rock. In smaller cracks occur bell-flower (Campanula rotundifolia), woodsia (Woodsia ilvensis), pale corydalis (Corydalis sempervirens), and numerous mosses.

The talus slopes have perhaps the most diverse vegetation of the trap-rock ridges especially when forested. Forested talus is dominated by sugar maple and white ash with basswood (Tilia americana) and butternut (Juglans cinera) occasional. In the spring, the forest floor can be carpeted by short lived species such as Dutchman's breeches (Dicentra cuccularia), bloodroot (Sanguinaria canadensis) and spring beauty (Claytonia caroliniana). On unstable talus, vines such as poison ivy (Toxicodendron radicans) and Virginia creeper (Parthenocissus quinquifolia), will grow together with numerous lichens and a few other plants such as Herb Robert (Geranium robertianum).

THE WETLAND SYSTEM

The wetland system in the project area is a relatively undisturbed drainage sequence which developed in bedrock depressions in the ridges and on a low lying deposit of peat and muck soils overlying glacial till to the south and west. The wetland system is composed of three isolated basins connected by intermittent streams draining to the south (see Figure 1). The upper basin is high on the ridge and is fed by rainfall and seepage from the surrounding slopes. This basin holds water for most of the year, draining only when the water level is above the bedrock spillway and/or evapotranspiration during the summer months. The dominant vegetation is buttonbush (Cephalanthus occidentalis) and tussock sedge (Carex stricta) with a small internal island of small white pine (Pinus strobus), red maple (Acer rubrum) and black gum (Nyssa sylvatica) trees.

The middle basin occurs within the gap and is fed by a seasonal stream from the upper basin and by runoff from the surrounding steep slopes. The vegetation is primarily an open tree cover of red maple with a variable shrub cover of winterberry (Ilex verticillata). The hummocky nature of the surface indicates that the water table drops considerably during the summer months, with the wetland draining primarily by surface flow to the south but also through percolation and evapotranspiration. The species composition is not unusual with admixtures of white pine and highbush blueberry (Vaccinium corymbosum) and a sparse herbaceous cover of tussock sedge, begger's ticks (Bidens spp) and others.

The lower basin is much larger than the other two and is dominated by red maple, yellow birch (Betula lutea), and white pine with a variable shrub layer and a well-developed herbaceous cover. Common shrubs include sweet pepperbush

(Clethra alnifolia), highbush blueberry, spicebush (Lindera benzoin) with Witch hazel (Hamamalis virginiana). Common herbs include skunkcabbage (Symplocarpus foetidus), cinnamon fern (Osmunda cinnamomea); marsh fern (Thelpteris palustris), and Tussock sedge. Mosses occur in the wet depressions of this area with sphagnum moss common. To the north and east the area adjoining the proposed road crossing has been recently logged and is presently a dense shrub thicket.

WILDLIFE HABITAT

The ridge system and adjoining wetland provides a diversity of habitats which are of great value to wildlife. Wildlife which can be expected to utilize this area include white tail deer, raccoon, skunk, oppossum, woodchuck, fox, pheasant, ruffed grouse, raptors, and a variety of songbirds, reptiles, and amphibians. The length and type of biological corridor offered by the subject area is comparatively rare in Connecticut. As indicated above, a number of rare plants and animals can be found within this wetland and ridge system.

B. Biological Impacts and Mitigation Measures

From a biological viewpoint, the potential impacts of greatest concern include: 1) loss of wetland area, 2) adverse impacts on wildlife, 3) possible degradation of water quality through siltation and road salts, 4) possible changes in drainage within the middle basin, and 5) possible creation of an unstable slope both to the north and south of the road.

While proper road design can mitigate some of these impacts, construction of the road in any form will lessen the present value of the wetland from a biological standpoint.

The day of the ERT's field review, several representatives from the town inquired about the impact of the project on wildlife habitat. The project will adversely affect wildlife habitat both directly and indirectly. Construction of the road will result in direct habitat loss through elimination of a portion of the wetland. Wildlife habitat will also be more indirectly affected by the increased human presence in the area. The increased traffic and associated noise will render the immediate project vicinity unsuitable for some of the more shy species of wildlife (e.g. numerous songbirds and the ringed-neck pheasant). It should be noted, however, that many of the more urban adapted species of wildlife will not be significantly affected by the increased traffic and noise levels. These more opportunistic species of wildlife include raccoon, skunk, squirrel, deer, woodchuck, and certain species of songbird.

The day of the Team's field review it was also questioned whether construction of the road would interrupt wildlife travelways. In this regard it should be noted that most reptiles and amphibians are local in nature and don't travel much. If habitat is good, the home range of certain species may be as little as 25 square feet. While some road kills of the more mobile reptiles and amphibians (frogs, turtles) can be expected with project implementation, the biggest impact of the project on these populations will be the direct loss of habitat through construction of the road itself. Other species of wildlife are more adept at crossing roads and with the exception of an occasional road kill, the project is not expected to significantly impact such species. Again, these "urban-adapted" wildlife species include deer, squirrel, raccoon, skunk, oppossum, woodchuck, and rabbit. It is not anticipated that the project will affect the raptor population in the area.

To minimize the adverse impacts of the project on wildlife, the following should be considered:

1) Install a short span of bridge over the intermittent stream area of the crossing. This will provide at least one area where wildlife can cross the notch area without crossing the road.

2) If guard rails are used on the road, require that a minimum 12" space be left between the ground surface and the bottom of the railing. This will allow those wildlife wishing to cross the road the opportunity.

In designing measures to mitigate the other impacts listed above, consideration should be given to the following:

1) Proper placement of all culverts utilized to ensure that the present hydrology in the area is not disrupted.

2) Minimize or avoid disruption of the talus slopes. It will be of less consequence to destroy more wetland area in the lower basin than to create an unstable slope at the base of the ridge. If this is not possible, strong retaining walls should be constructed, or a buffer strip established to eliminate rock slides onto the road.

3) Avoid direct discharge of road drainage into the channel of Chidsey Brook. Stormwater from the road should be dispersed at numerous points on the south size of the road. The large size of the lower basin and the dense shrub growth should minimize the impacts of road-salts and other runoff.

4) If possible, monitor the present construction to the east. Presently the large areas of gravel fill are creating siltation problems within the middle wetland basin, especially along the upper brook and in the area of present road construction. Siltation may influence the suitability of the middle basin to function as an active amphibian breeding site and may change the character of the wetland.

To conclude, the area surrounding the proposed Woodmont/Juniper connection provides a scenic and aesthetic landscape which provides a diversity of habitats that can be of great value as open space for activities such as hiking, nature study, bird watching, etc. Construction of the proposed road will diminish the attraction of this area for such uses and purposes. Should the Town of Avon determine that an east-west road connection is necessary through this area, however, it is suggested that consideration be given to implementing the aforementioned mitigation measures.

VII. CLIMATOLOGY

The General Climate of the area may be summarized as follows:[1]

Mean Annual Precipitation	46 inches (117 cm)
Mean Annual Snowfall	50 inches (127 cm)
Mean Annual Temperature	$49^{\circ}F$ ($9^{\circ}C$)
Mean Annual Heating Degree days	6400
Mean Annual Length of frost free season	160 days
Average date of first fall freeze	9/30
Average date of last spring freeze	5/5
Mean Annual Evaporation	23 inches (58 cm)

The combination of high steep ridges running north and south and the flat wetlands of the area cause large variations in the average solar radiation loads that can be expected on the different land forms. The table on the following page summarizes the average radiation fluxes that can be expected.

The prevailing summer winds are from the southwest and will blow through the notch. During the winter months the prevailing winds are from the northwest and the area in question will be generally protected by the north ridge.

The protective influence of the ridges on airflow will generally cause atmospheric inversion systems to persist longer in this area than in nearby areas. Inversions occur in all seasons of the year, but most often in late summer, fall and early winter months.

EFFECTS OF THE PROPOSED ROADWAY

The proposed roadway will not have a significant effect on the general climate or microclimate of the area. Local air pollution loads will be increased, however, due to traffic through a wind protected area. This pollution loading will be most significant during periods of temperature inversion when there is very little movement of air. Even during such periods of temperature inversion, however, the elevated air pollution levels are not likely to be harmful to human health or local flora or fauna. It should be noted that the increase in air pollution in this area will more than be offset by reduction of air pollution on Country Club Road due to decreased traffic. Therefore, the net effect will probably be to reduce the general area air pollution concentration.

Road noise will also be increased due to increased traffic. This will be in direct proportion to the amount of traffic on the road. The presence of the ridges is an advantage in this case because they will absorb large amounts of the noise produced. But the higher incidence of local atmospheric inversions will increase the problem, especially at night due to ducting of sound waves under inversions. Therefore, the noise problem will probably be a serious one, especially at night. It is anticipated that the elevated noise level will be offensive to the surrounding neighborhood and will also adversely impact wildlife populations. Mitigation of traffic noise is best applied at the source. Unfortunately, in this instance, there is very little that can be done with the exception of constructing solid walls or earth berm barriers on the approach roads.

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[1] from "The Climate of Connecticut", J.J. Brumback, Bulletin 99, State Geological and Natural History Survey, 1965".

Approximate Average Weekly Solar Radiation Flux Density at 41° 45' Latitude (cal cm^{-2} day^{-1})

Weeks of the year	Level wetland 0 - 10%	North facing Slope of the south ridge	South facing slope of the north ridge	East and West facing ridge slopes
March 1	243	127	332	243
March 8	223	127	292	222
March 15	263	163	331	261
March 22	358	238	435	355
March 29	320	226	375	316
April 5	348	259	395	343
April 12	426	333	470	419
April 19	392	319	421	385
April 26	367	308	384	359
May 3	346	300	354	339
May 10	384	341	385	375
May 17	346	314	342	338
May 24	484	446	471	472
May 31	438	409	422	427
June 7	412	388	394	401
June 14	382	361	364	371
June 21	410	387	390	398
June 28	493	464	471	479
July 5	524	490	503	510
July 12	364	336	353	354
July 19	447	406	439	436
July 26	402	358	402	392
August 7	414	360	422	405
August 9	434	367	452	425
August 16	430	352	458	422
August 23	478	377	524	470
August 30	363	274	409	357
Sept. 6	360	258	419	356
Sept. 13	309	209	372	306
Sept. 20	285	180	356	283
Sept. 27	267	145	346	266
Oct. 4	292	157	394	292
Oct. 11	253	123	355	254
Oct. 18	251	108	368	253
Oct. 25	241	91	367	243
Nov. 1	197	64	315	200
Nov. 8	173	47	287	176
Nov. 15	180	41	310	184
Nov. 22	169	31	302	173
Nov. 29	157	24	288	161
Dec. 6	155	20	291	159
Dec. 13	145	16	276	149
Dec. 20	121	13	232	125
Dec. 27	141	17	267	145
Jan. 3	171	23	318	176
Jan. 10	152	25	277	156
Jan. 17	179	36	315	183
Jan. 24	185	46	313	188
Jan. 31	200	60	325	203
Feb. 7	217	76	339	220
Feb. 14	228	92	340	229
Feb. 21	232	107	332	233

[2] from "Estimation of Direct Solar Radiation on Slopes in Connecticut", D. Miller and F. Hammond, Buttletin 452, Storrs Agricultural Experiment Station, UConn, Storrs, 1979.

VIII. RECREATION AND OPEN SPACE CONSIDERATIONS

From a recreational standpoint, the ridges in the study area offer the only suitable area for use by visitors while the wetland itself provides complimentary scenic and wildlife habitat value.

Passive recreation is seen as the only realistic and practical use of the study area in combination with the vehicular crossing proposed. Walking trails traversing the hilltops would provide scenic vistas to surrounding lowlands and distant hills. It was noted that the "Sleeping Giant" formation of hills in Hamden is visible from the peak northwest of the proposed connector road. Wildlife observation opportunities would also be afforded trail users. Sitting on the peak where vegetation is sparse would enable observation of soaring birds such as turkey vultures and hawks.

Since the slopes of the hills are steep and at least partly made up of talus, great care must be taken to route a trail where the potential for erosion and injury is minimized. Short of installing stairs, switchbacks and gradually climbing hillside trails may have to be employed to ascend and descend the peaks.

If practicable, it would be desirable to extend foot trails beyond the limits of the study area so that those contained in it would not be an isolated entity, but rather a component of a larger more challenging trail providing even more diversity and the likelihood of better utilization. Since the landform in the study area is diverse, it could be used by schools as a geological study area. The combined use of foot trails for hiking and nature study is a complimentary one.

With project implementation, a road crossing for hikers will be necessary if a north to south foot trail is installed in the study area. Such a crossing should be considered in design and layout of the road to make it as safe as possible for pedestrians.

The recreational opportunities for the study area, while seen as being very limited, are nonetheless good for the uses stated and worthy of the efforts necessary to put it to those uses.

Consideration should be given to creating a small parking lot adjacent to the connector road if the project is approved. This will enhance access to the recreational and open space opportunities afforded by the area.

Construction of the connector road itself will enhance access to the ridge area and its amenities. On the other hand, the road will diminish the open space value of the area, at least in the immediate vicinity of the road. With construction of the road, the "wilderness experience" presently offered by the area will be diminished.

X. ALTERNATIVES TO THE PROPOSED ACTION

The ERT was asked the day of the field review to consider alternatives to the proposed action. Specifically, the Team was asked to comment on an alternate road that would connect Stagecoach Road to the west with Arch Road to the east (see Figure 7). The ERT believes this alternate road has a greater potential for impact to the wetland than does the current proposal. The alternate connector road would 1) generate more roadway runoff to the wetland, 2) disturb more wetland area, 3) require greater modification of the land due to the fill that would be required to accommodate the gradient through the ridge, and 4) result in greater construction impacts.

A review of existing land use and topography in the area indicates that the Woodmont/Juniper connection is the most logical route if a connector road is to be constructed within the study area.

The wetland is narrower here, development has already "encroached" from both sides of the wetland, and the land here has already been disturbed (i.e. the extant water line).

A "no build" alternative would clearly better protect the character of the wetland system and its associated ridges than the construction of any road. Whether or not the road should be built, however, is properly a decision for the Town of Avon to make after thoughtful consideration of environmental, economic and public safety issues.

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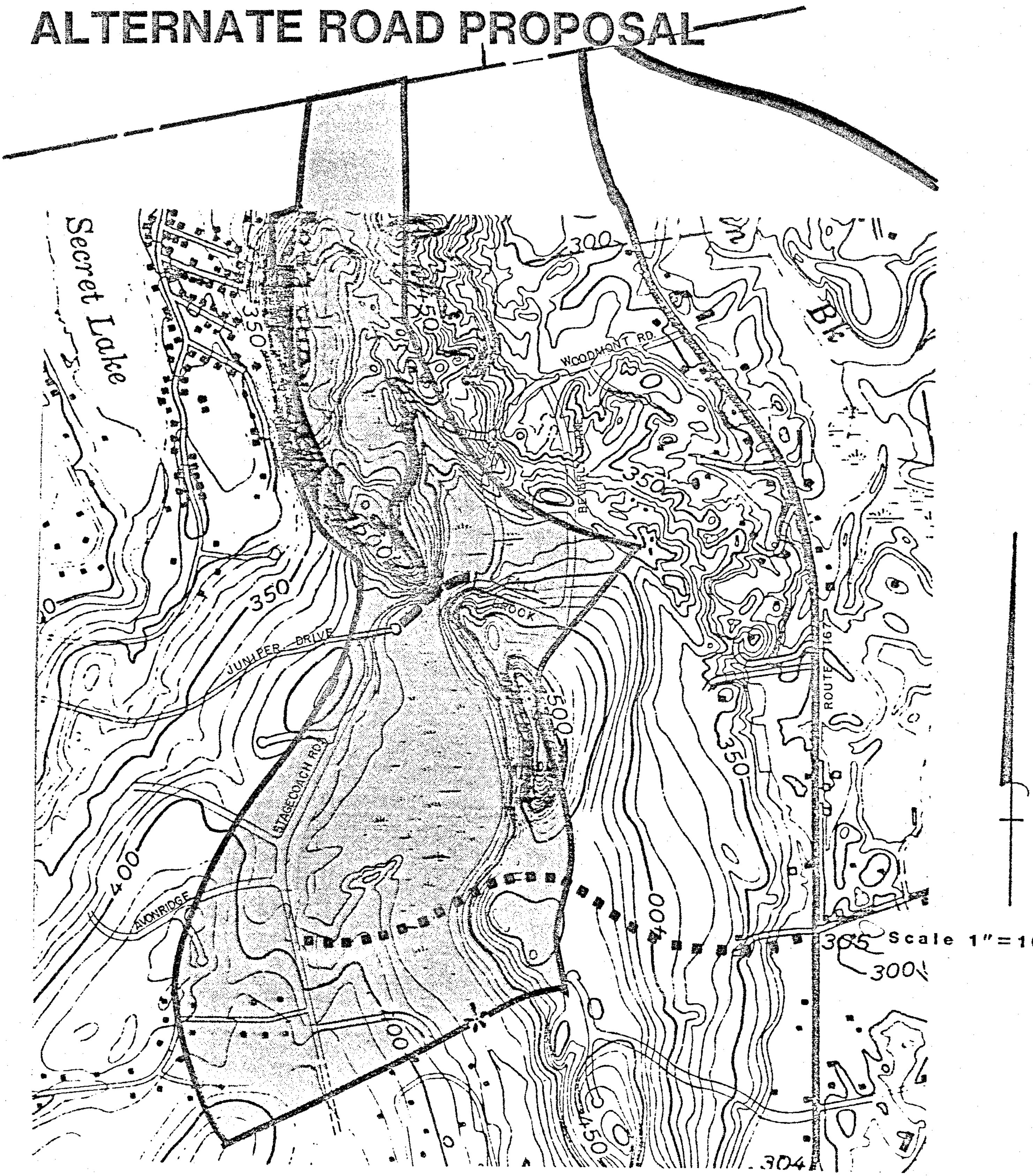
FIGURE 7
ALTERNATE ROAD PROPOSAL



Scale 1"=100

PROPOSED CROSSING

ALTERNATE CROSSING

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.