QUAKER FARMS SCHOOL OUTDOOR CLASSROOM

OXFORD, CONNECTICUT

King's Mark Environmental Review Team Report

King's Mark Resource Conservation and Development Arera, Inc.

QUAKER FARMS ELEMENTARY SCHOOL

OXFORD, CONNECTICUT

Environmental Review Team Report

Prepared by the
King's Mark Environmental Review Team
of the King's Mark
Resource Conservation and Development Area, Inc.

for the
New Haven County
Soil and Water Conservation District and the
Oxford Board of Education

July 1997

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ACKNOWLEDGMENTS

This report is an outgrowth of a request from the New Haven Soil and Water Conservation District (SWCD) and the Oxford Board of Education to the King's Mark Resource Conservation and Development Area (RC&D) Executive Council for their consideration and approval. The request was approved and the measure reviewed by the King's Mark Environmental Review Team (ERT).

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

The field review took place on Thursday, April 24, 1997.

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I would also like to thank Nancy Gaumer, executive director of the New Haven County SWCD, Robert Martino, principal of Quaker Farms School and Jeffrey Warzeniak of Watercress Gardens, for their cooperation and assistance during this environmental review.

Prior to the review day, each Team member received a summary of the proposed project with location and soils maps. During the field review Team members were given additional information concerning the project. Following the review, reports from each Team member were submitted to the ERT coordinator for compilation and editing into this final report.

This report represents the Team's findings. It is not meant to compete with private consultants by providing site plans or detailed solutions to development problems. The Team does not recommend what final action should be taken on a proposed project - all final decisions rest with the school and District. This report identifies the existing resource base and evaluates its significance to the proposed development, and also suggests considerations that should be of concern to the school and District. The results of this Team action are oriented toward the development of better environmental quality and the long term economics of land use.

The King's Mark RC&D Executive Council hopes you will find this report of value and assistance in creating, enhancing and utilizing this outdoor classroom.

If you require additional information please contact:

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INTRODUCTION

The New Haven County Soil and Water Conservation District (SWCD) and the Oxford Board of Education have requested assistance from the King's Mark Environmental Review Team in conducting an environmental review of the Quaker Farms School Outdoor Classroom.

The 2 1/2 acre site is located on a wooded knoll adjacent to the Quaker Farms Elementary School and the Great Oak Middle School. The New Haven County SWCD did the initial design for the site which will include a trail with nature study areas defined. The SWCD has received a grant for the construction of a "sugar shack" adjacent to this site at the edge of the athletic fields. At the time of the field review some clearing of trees had taken place and a DEP forester had been on the site for recommendations.

Objectives of the ERT Study

The SWCD is involved with the planning, design, construction, and funding for the outdoor classroom and the development of education materials for the project. The ERT was asked to assist with further biological and physical resource information to assist them in the implementation of the classroom. Due to the timing of the request and the field review much of the design was complete and construction had started.

The ERT was also asked to evalute an area that could be developed for a wetland outdoor classroom and possible wetland restoration and enhancement.

The ERT Process

Through the efforts of the New Haven County SWCD and the Board of Education this environmental review and report was prepared for the Town of Oxford.

This report provides an information base and a series of recommendations and guidelines which cover the topics requested. Team members were able to review maps and supporting documentation provided by the applicant.

The review process consisted of four phases:

1. Inventory of the site's natural resources;
2. Assessment of these resources;
3. Identification of resource areas and review of plans and reports; and
4. Presentation of education, management and land use guidelines.

The data collection phase involved both literature and field research. The field review was conducted on April 24, 1997. The emphasis of the field review was on the exchange of ideas, concerns and recommendations. Being on site allowed Team members to verify information and to identify other resources.

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

GEOLOGY

The site of the proposed Outdoor Classroom is a small bedrock knoll south of the Quaker Farms Elementary School. The rounded streamlined shape of the hill is a direct result of the erosive grinding action of rock debris at the base of a half mile or more of flowing glacier ice at the height of the last major ice age 20-30,000 years ago. Rounded bedrock hills such as this are common in glaciated areas and are termed "roche moutonnee."

The bedrock surface on the site is partly concealed by a thin veneer (at most a few feet in thickness) of well rounded sands and gravels and an overlying irregular thin blanket of fine silty loam. The sands and gravels are the product of meltwaters reworking and redepositing the poorly sorted ground-up debris (till) carried at the base of the ice sheet. The bedrock knobs and ridges forming the high ground along Great Oak Road were amongst the first hilltops to appear as the ice retreated from the area roughly 14,000 years ago. Rapidly flowing meltwater streams in collapsed crevasses and ice tunnels along this ridge washed the bedrock knolls clean of till and left behind a thin deposit of well rounded gravels and sand. After the ice had disappeared from the area, but before vegetation was well established, winds picked up and redeposited in well protected spots the fine sand and silt which now forms the patches of loamy topsoil on the site.

14,000 years of exposure to the elements has taken its toll on the bedrock on the knoll. Many of the outcrops are now a jumble of large angular rock fragments. Frost and the wedging action of tree roots invading cracks and joints in the originally solid rock has broken-up and displaced large blocks. These blocks form a giant three-dimensional jigsaw puzzle which can be reassembled, at least in ones mind, to form a picture of the smooth rounded knoll just after the ice disappeared.

The bedrock itself is of much greater antiquity than the last ice age (by several hundred million years). The rocks were originally eroded 450 million years ago from an island arc similar to the modern day Japanese islands and deposited as muds on the adjacent ocean floor. 350 or so million years ago the island arcs and ocean floor sediments were caught up in the collision of North America and an ancient continent known to geologists as Avalon. As a result the rocks on the knoll were deeply buried, deformed, heated and completely recrystallized to form the present day fine-grained laminated quartz-feldspar biotite muscovite gneiss. A record of the intense deformation is preserved as contorted folded layers which are very conspicuous along the northern cliff face of the knoll. At a deeper level, perhaps a half-mile or more down, the temperature exceeded the melting point of the rocks. Granitic melts intruded upwards and are seen to cut the fine grained gneisses in a series of pink to white colored pegmatite dikes and sills. The pegmatites are much coarser grained and are easily recognized by the inch-sized quartz, feldspar and muscovite grains they contain. A few dikes also contain large black tourmaline crystals.

In summary the following significant geologic features and processes are clearly visible at the classroom site:

Features dating from 350,000,000 years ago

- Metamorphism - the present gneiss was originally a sea floor mud sediment
- Deformation - the layering, originally horizontal is now near vertical and locally deformed into a series of foot scale folds
- Igneous Intrusion - dikes and sills of granite pegmatites
- Rock-forming minerals - the pegmatites contain cm-size grains of quartz, feldspar, mica (!), and tourmaline.

Relatively recent features (< 30,000 years)

- Glacial Erosion - the knoll itself is a "roche moutonnee"
- Stratified Drift - the sands and gravels covering parts of the knoll and surrounding area were transported and deposited by glacial meltwaters
- Wind Deposited Fine Sands and Silts - the fine loam which has accumulated in protected depressions overlying the sand and gravel
- Mechanical Weathering - the frost and root shattering of the originally massive outcrop areas.
- Soil Forming Processes - visible in any trench dug into the hillside

References

Robert B. Scott, 1973, Bedrock Geology of the Southbury Quadrangle, Connecticut, Connecticut Geological and Natural History Survey, Quadrangle Report QR-30.

Fred Pessel Jr., 1975, Surficial Geology of the Southbury Quadrangle, Connecticut, Connecticut Geological and Natural History Survey Open File Report 75-172.

Terminology

Roche moutonnee: A glacially sculptured knob of bedrock, with its long axis oriented in the direction of ice movement.

Till: Unstratified drift, deposited directly by a glacier without reworking by meltwater, and consisting of a mixture of clay, silt, sand, gravel, and boulders ranging widely in size and shape.

Stratified drift: Glaciofluvial material consisting of sorted and layered material deposited by a meltwater stream or settled from suspension in a body of quiet water adjoining a glacier.

Minerals

Quartz: Crystalline silica, an important rock-forming mineral, SiO2. Next to feldspar it is the commonest mineral. It has a vitreous luster, a concoidal fracture, an absence of cleavage and a hardness of 7 on the Mohs scale.

Feldspar: A group of abundant rock-forming minerals of the general formula, Ma1(Al,Si)3O8, where M can be K, Na, or Ca. Feldspars are the most widespread of any mineral group and constitute 60% of the earth's crust; they occur in all types of rock. Feldspars are white and gray to pink, have a hardness of 6, are commonly twinned, have monoclinic symmetry, and show good cleavage in two directions.

Biotite: A common rock-forming mineral of the mica group: K(Mg,Fe+2)3(Al,Fe+3)Si3O10(OH)2. It is black in hand specimen and has perfect basal (001) cleavage.

Muscovite: A mineral of the mica group: Kal2(AlSi3)O10(OH)2. It is colorless to pale brown, and is a common mineral in gneisses, schists, granites and pegmatites.

Tourmaline: A group of minerals of general formula (Na,Ca)(Mg,Fe+2,Fe+3,Al,Li)3A16(BO3(3Si6O18(OH)4. Tourmaline occurs in 3-, 6-, or 9- sided prisms, usually vertically striated or in compact or columnar masses; it is commonly found as an accessory mineral in granitic pegmatites, and is widely distributed in acid igneous rocks. When transparent and flawless, it may be cut into gems.

Figure 1

Location and Topographic Map

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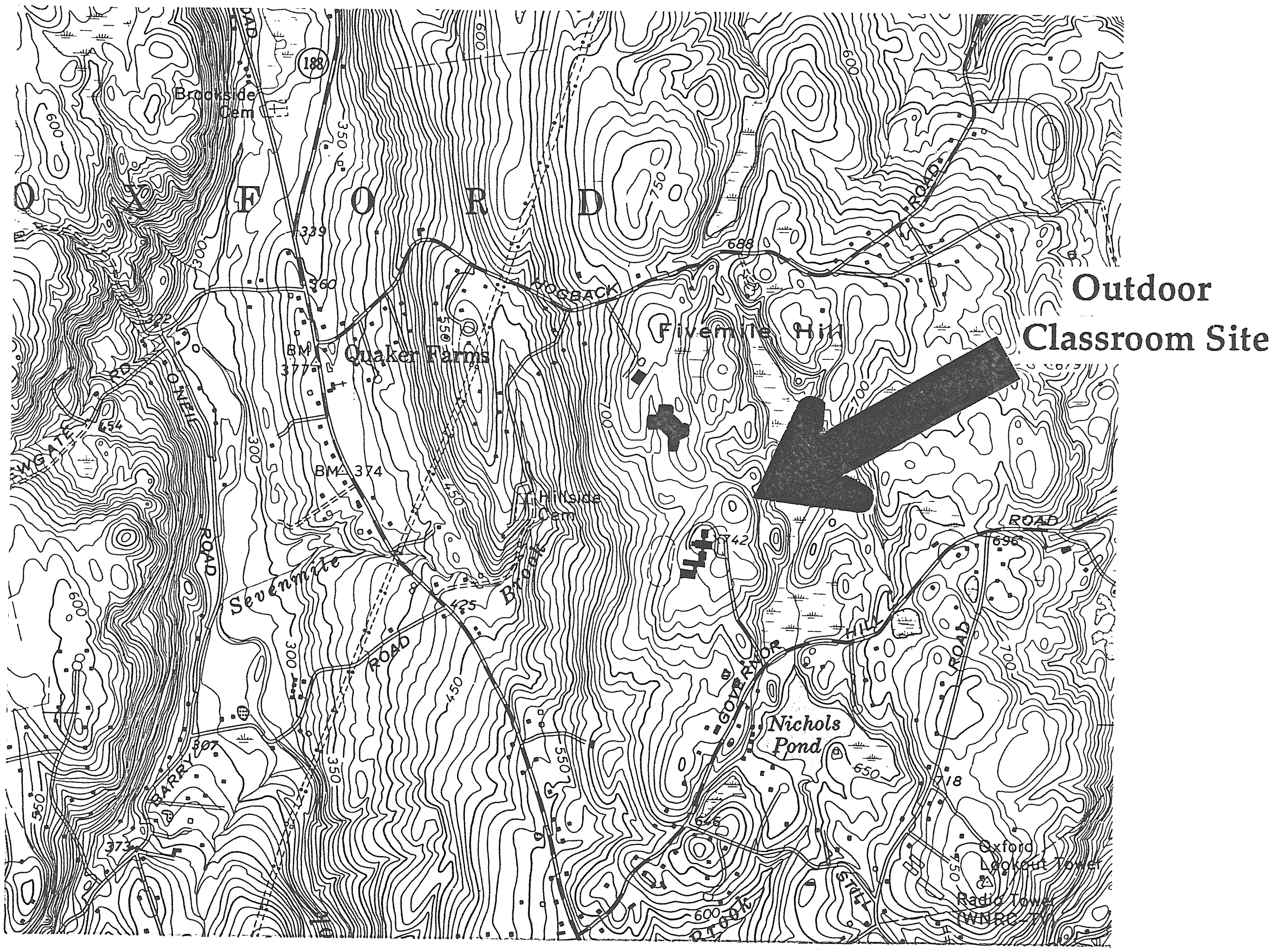
Scale 1" = 2000'



SOIL RESOURCES

This soils report applies to the wooded knoll south from the Quaker Farms Elementary School and northeast of Great Oak Middle School. The information in this report is based on the soil series descriptions and the mapping units descriptions as presented in the 1979 USDA Soil Survey of New Haven County, and on field observations. For more details on soil suitability and limitations reference the Soil Survey of New Haven County.

The site can be found in Sheet 33 of the New Haven County Soil Survey (see Figure 3). The eastern section of the knoll was mapped as HpE. The western section of the Knoll was mapped as HSE.

Mapping Units

HpE: Hollis - Charlton fine sandy loams, 15 to 35 percent slopes. This map unit consists of moderately steep, somewhat excessively drained soils on uplands where the relief is affected by the underlying bedrock. Slopes are concave or convex and are mostly 100 to 800 feet long. The areas have a rough surface and bedrock outcrops, a few narrow intermittent drainage ways, and small wet depressions.

In this mapping unit, the Hollis and Charlton soils are so intermingled on the landscape that they could not be separated in mapping. The typical Hollis soil has a very dark brown fine sandy loam surface layer 3 inches thick. The subsoil is dark brown fine sandy loam 11 inches thick, and it overlies hard, unweathered schist bedrock. The typical Charlton soil has a dark brown fine sandy loam surface layer 2 inches thick. The subsoil is dark brown, yellowish brown, and light olive brown fine sandy loam 24 inches thick. The substratum, to a depth of 60 inches, is grayish brown, gravelly fine sandy loam, with a few firm lenses up to 4 inches thick.

The Hollis soil has moderate or moderately rapid permeability above the bedrock. It has a low available water capacity. Runoff is rapid. The Charlton soil has moderate or moderately rapid permeability. It has a high available water capacity. Runoff is rapid. Both soils have a low shrink-swell potential. Unless limed, they are medium acid through very strongly acid.

This map unit has poor potential for community development, and is poorly suited to crops. This map unit is limited mainly by steep slopes, shallowness to bedrock, rock outcrops, and stoniness. Hollis soils are also droughty.

HSE - Hollis-Rock outcrop complex, 15 to 35 percent slopes. This map unit consists of moderately steep and steep, somewhat excessively drained soils on upland areas of rock outcrop. The relief is affected by the underlying bedrock. Slopes mainly are convex and 100 to 700 feet long. These areas have bedrock outcrops, a few narrow intermittent drainage ways, and small wet depressions.

The Hollis soil and Rock outcrop are so intermingled on the landscape that they could not be separated in mapping at the scale used. The typical Hollis soil has a very dark brown fine sandy loam surface layer 3 inches thick. The subsoil is dark brown fine sandy loam 11 inches thick and overlies hard unweathered bedrock. Rock outcrop is exposed hard bedrock.

The Hollis soil has moderate or moderately rapid permeability above the bedrock. It has a low available water capacity. Runoff is rapid. This soil has a low shrink-swell potential. Reaction is medium acid through very strongly acid. Rock outcrop has very rapid runoff.

This map unit has poor potential for community development, and is poorly suited to crops. This map unit is limited mainly by steep slopes, shallowness to bedrock, rock outcrops, and stoniness. Hollis soils are also droughty.

Soil Series

Charlton Series: The Charlton Series consists of coarse-loamy, mixed, mesic Typic Dystrochrepts. These soils are well drained and nonstony to extremely stony and have a yellowish brown and light olive brown fine sandy loam B horizon over a grayish brown gravelly fine sandy loam C horizon.

Charlton Soils formed in glacial till that was derived mainly from schists and gneiss. Charlton soils are on broad hilltops, ridgetops, and side slopes. Slopes range from 3 to 35%.

Charlton soils are on the landscape in association with the well drained Canton soils, the moderately well drained Sutton soils, and the poorly drained Leicester soils. They are on the same landscape as the Paxton soils.

Typical pedon of Charlton fine sandy loam: 0 - 1.5 inches to 0; partially and well decomposed hardwood forest litter.

A - 0 to 2 inches; dark brown (l0YR 3/3) fine sandy loam; weak fine granular texture; very friable; many fine and medium roots; 5% rock fragments; very strongly acid; clear wavy boundary.

Bw1 - 2 to 6 inches; dark brown (7.5YR 4/4) fine sandy loam; weak coarse granular structure; very friable; many fine and medium roots; 12% rock fragments; very strongly acid; clear wavy boundary.

Bw2 - 6 to 18 inches; yellowish brown (l0YR 5/6) fine sandy loam; weak medium subangular blocky structure; very friable; common fine and medium roots; 12% rock fragments; very strongly acid; clear wavy boundary.

Bw3 - 18 to 26 inches; light olive brown (2.5YR 5/4) fine sandy loam; massive; very friable, 15% rock fragments; very strongly acid; abrupt wavy boundary.

C - 26 to 60 inches; grayish brown (2.5YR 5/2) gravelly fine sandy loam that has lenses of loamy sand; massive; friable with few firm lenses; few roots; 25% rock fragments; strongly acid.

The solum is 20 to 36 inches thick. Rock fragments, including stones and cobbles, range from 5 to 25% in the solum and from 5 to 35% in the C horizon. Where these soils are not limed, reaction ranges from very strongly acid through medium acid.

The A horizon has hue of 10YR through 2.5Y, value of 4 through 6, and chroma of 2 or 3 . The B horizon has hue of 7.5YR through 2.5Y, value of 4 through 6, and chroma of 4 through 6. Texture is fine sandy loam, sandy loam or the gravelly analogs. Structure is weak medium subangular blocky, or the horizon is massive. Consistency is friable or very friable. The C horizon has a hue of 10YR through 5Y, value of 4 through 6, and chroma of 2 through 4. Texture is fine sandy loam, sandy loam, or the gravelly counterparts. Many profiles have lenses of loamy sand up to 4 inches thick. Consistence is friable.

Hollis Series: The Hollis series consists of loamy, mixed, mesic Lithic Dystrochrepts. These soils are somewhat excessively drained and have a dark brown fine sandy loam B2 horizon over hard unweathered bedrock. They formed in a mantle of glacial till derived mainly from gneiss and schist. Hollis soils are on hilltops, ridges, and knolls of bedrock-controlled glacial till plains. Slopes range from 3 to 35%.

Hollis soils are on the same landscape as the Charlton and Canton soils, which are more than 40 inches deep to bedrock, and Sutton soils, which are moderately well drained.

Typical pedon of Hollis fine sandy loam, in an area of Charlton-Hollis fine sandy loams:

0 - 2 inches to 0; undecomposed and partially decomposed hardwood leaves and twigs.

A - 0 to 3 inches; very dark brown (10YR 2/2) fine sandy loam; weak medium granular structure; friable; many fine and medium roots; 10 % coarse fragments; strongly acid; clear wavy boundary.

Bw - 3 to 15 inches; dark brown (7.5YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; many fine and medium roots; 10 % coarse fragments; strongly acid; abrupt wavy boundary.

R - 15 inches; hard, unweathered schist bedrock.

Thickness of solum and depth to bedrock range from 10 to 20 inches. Rock fragments range from 2 to 25%, including stones and boulders. Reaction ranges from very strongly acid through medium acid.

The A horizons have a hue of 10YR, value of 2 through 4, and chroma of 2 to 3 . The B horizons have a hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 through 6. Texture is commonly fine sandy loam, but can be sandy loam. Structure is weak medium subangular blocky, or the horizon is massive. Consistence is friable or very friable.

Onsite Soils

The following is a description of the soils at the site. Four bores were dug in the wooded knoll area. One bore was dug in the north-central section of the knoll, one bore was dug in the south-central section of the knoll, one bore was dug in the west side of the knoll, and one bore was dug in the east side of the knoll. A spade and an auger were used to examine soil profiles. Information from the site concurred with the information presented in the Soil Survey of New Haven County.

The soil profiles from the two bores in the north and south central areas of the knoll, and the bore in the west section of the knoll were similar to each other and fit the following description:

0 - .5 inches to 0; undecomposed and partially decomposed hardwood leaves and twigs.

A - 0 to 1.5 inches; dark brown (l0YR 3/2); fine sandy loam; weak granular; friable.

Bwl - 1.5 to 4 inches; yellowish brown (l0YR 4/4), fine sandy loam; moderate, subangular blocky, friable.

Bw2 - 4 to 36 inches; yellowish brown (7.5YR 5/6), sandy loam; weak subangular blocky; friable.

C - 36 to 42 inches; grayish (l0YR 6/3) loamy sand, weak, massive, very friable.

The soils in the central and western section of the knoll fit the description of the Canton series, which are a very common component of the HpE mapping unit as described in the Soil Survey of New Haven County.

The Canton series consists of well drained, nonstony to extremely stony soils that formed in sandy glacial till. Canton soils are near somewhat excessively drained Merrimac and

Hollis soils; well drained Charlton and Montauk soils; moderately well drained Sutton soils, and poorly drained Leicester soils. Canton soils have more sand in the C horizon than Charlton soils and have a more friable substratum than Montauk soils.

Typical pedon of Canton fine sandy loam in an area of Canton and Charlton very stony fine sandy loam:

A - 0 to 1 inch, black (10YR 2/1) fine sandy loam; weak fine granular structure, very friable; common fine and medium roots; strongly acid; abrupt wavy boundary.

Bwl - 1 inch to 5 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium granular structure; very friable, common fine and medium roots; 10% rock fragments; strongly acid; gradual wavy boundary.

Bw2 - 5 to 15 inches; dark yellowish brown (10YR 4/6) sandy loam; weak medium granular structure; very friable; common fine and medium roots; 15% rock fragments; strongly acid; gradual wavy boundary.

Bw3 - 15 to 24 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium granular structure; very friable; few fine roots; 10% rock fragments; strongly acid; gradual wavy boundary.

C - 24 to 60; grayish brown (2.5Y 5/2) gravelly loamy sand; massive; friable; 20% rock fragments; strongly acid.

The solum is 18 to 36 inches thick. Rock fragments make up to 5 to 25 percent of the solum and 10 to 30 percent of the C horizon. Unless limed, Canton soil are strongly acid or medium acid.

The A horizon has hue of 10YR, value of 2 through 4, and chroma of 1 through 3 . The upper part of the B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 through 8. The lower part of the B horizon has hue of 10YR or 2.5Y, value of 4 through 7, and chroma of 3 through 6. The B horizon is fine sandy loam in the upper part and fine sandy loam, sandy loam, or gravelly analogues in the lower part. The B horizon has weak granular or weak subangular blocky structure, or it is massive. It is very friable or friable.

The C horizon has a hue of 10YR through 5Y, value of 5 through 7, and chroma of 2 through 4. The C horizon is loamy fine sand, loamy sand, sand, or their gravelly analogues. It is single grain, or the horizon is massive. The C horizon is loose, very friable, or friable.

Although Canton soils are not listed in the 1979 USDA Soil Survey of New Haven County, these soils have traditionally been mapped together with Charlton soils, and are a very common inclusion in the Hollis-Charlton mapping units.

The east side of the knoll is very shallow to bedrock and it has many rock outcrops. The one bore dug in the east side of the of the knoll was approximately 18 inches deep. The soils in this area were similar to the soils in the in rest of the knoll, but were much shallower to bedrock, and did not exhibit a C horizon. This area is more representative of the HSE mapping unit as described in the Soil Survey of New Haven County.

Figure 2

Soils Map

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Scale 1" 1320'

WETLAND RESOURCES

There are no inland wetlands in the vicinity of the proposed outdoor classroom area. The closest wetland area is approximately 600 feet to the southwest of the proposed area and consists of a narrow band of deciduous-forested palustrine wetlands associated with an intermittent watercourse which emanates from a culvert and head-wall at the base of large fill-slope. This watercourse situated on a 20% slope facing to the west appears to flow toward the Hillside Cemetery where it joins with the Sevenmile Brook.

This area seems to offer little opportunity for environmental education as it relates to wetland issues. The wetlands here are limited in size and vegetative habitat diversity. The issue of wetland restoration/creation was raised during the sitewalk. It is not clear that any substantive filling of wetlands have taken place at this location. Aerial photo interpretation reveals that some filling of intermittent drainage-ways had occurred as a result of fill placement for the athletic fields and the two schools. The creation of wetlands along this drainage system is not recommended due to the significant amounts of fill that would need to be removed as well as the limited hydrology present to support the created wetland area.

However, aerial photo inspection reveals a much more extensive, diverse system located 800 feet to the east of Quaker Farms Elementary School. If this wetland area is on municipal property and easily accessible, it would be a much better resource to be developed for wetland science education than the western wetland area previously described. Perhaps this area could become the subject of an ERT study sometime in the future if there is an interest.

WILDLIFE RESOURCES

This section of the report will address the following wildlife resource issues:
1. Current conditions for wildlife
2. Planning for wildlife
3. Wildlife/nature trail potential
4. Other considerations and conclusions.

Current Conditions

The following wildlife were observed during the site visit either directly or indirectly and evidence of their presence was confirmed by identifying tracks, scat, calls, or other sign. American crow (*Corvus brachyrhynchos*), wild turkey (*Meleagris gallopavo*), tufted titmouse (*Parus bicolor*), black-capped chickadee (*Parus atricapillus*), downy woodpecker (*Picoides pubescens*), gray squirrel (*Sciurus carolinensis*), and white-tailed deer (*Odocoileus virginianus*). Because the property is adjacent to larger forest blocks, one can expect it to be frequented by many of the common adaptable wildlife as well as some of the lesser known forest interior wildlife.

Planning for Wildlife Habitat

As properties become developed, natural areas are divided into smaller, isolated pieces. Land that is in public ownership can be managed for wildlife habitat for the long term. In contrast, private land, which consists of 88 percent of the land in Connecticut, usually changes ownership and is mostly not managed for wildlife for the long term. Wildlife habitat near suburban areas can be places for citizens to enjoy wildlife in close proximity to where they live. A public school property, such as this one, can be managed as a natural area for the long term and provide habitat for wildlife. It can also be a place for students, teachers and the general public to learn about nature. In a survey of urban residents in five metropolitan areas of New York State, 96 percent of the respondents indicated that it was important for their children to learn about nature and 73 percent were interested in wildlife in their backyard or neighborhood area (Brown et. al. 1979).

Outdoor Living Classroom Potential

Wildlife habitat is represented by the collective summation of all the environmental factors that occur at a given location such as food, water, cover and their spatial arrangement. As Oxford's natural areas become smaller and more isolated, the value of publicly owned natural areas will increase. The remaining natural areas will be important as refugia for wildlife and places to observe natural vegetation and the associated wildlife. The property can be useful in teaching the students and adults of the community how to recognize the various components of habitat and help them understand the function of habitat and the importance of habitat for the existence of wildlife. With careful planning, this area has the potential to be a learning environment for not only the students and faculty, but also the community.

A component of the proposed interpretive stations should revolve around the theme that wildlife need food, water, cover and space to survive. Habitat can be broken down into various components such as:

1. Spring and early summer seeds
2. Summer berries
3. Fall berries
4. Winter persistent foods
5. Conifers and evergreens
6. Nuts and acorns
7. Grasses and forbs
8. Nectar plants
9. Dead or decaying trees
10. Artificial nest boxes
11. Brush and/or rock piles
12. Water sources.

Examples of the various habitat components can be located on the property in the outdoor classroom areas and along a nature trail between stations. The plants which supply the seasonal foods and cover for wildlife can be identified using trail signs or markers. A trail guide can be developed which corresponds to numbered habitat components and points of interest along the trail. This can reduce the maintenance of signs and requires the trail user to pick up a guide from the school or centralized trail head.

During the field inspection, the Team wildlife biologist noted a variety of understory plants such as highbush blueberry (*Vaccinium corymbosum*), black huckleberry (*Gaylussacia baccata*) and maple-leaf viburnum (*Viburnum acerfolium*) in the areas proposed for outdoor classroom placement. An effort should be made to incorporate information about the locally native plants into the "lesson plan" for each classroom. Also, any plantings in the outdoor classroom areas should consist of native materials as much as possible. The proposed list of plantings included several species which are considered to be invasive exotics (please see Appendix). Plant materials should not include any invasive exotics. Adjacent to the outdoor living classroom are two 3 inch caliber non-native Norway maples (*Acer platanoides*) which are invasive exotics that were planted when the school was built. If these trees are not removed soon they will begin to spread their seed throughout the outdoor living classroom area and compete with the native vegetation for growing space. These exotics should be removed and replaced with native Sugar maples (*Acer saccarum*). Sugar maples will provide winged seeds for wildlife in the fall as well as sap for the planned sugarhouse.

The following non-native trees, shrubs and vines should not be planted and, if present, should be removed:

- Norway Maple (*Acer platanoides*)
- Tree of Heaven (*Ailanthus altissima*)
- Catalpa (*Catalpa spp.*)
- Autumn Olive (*Elaeagnus altissima*)
- Winged Euonymus (*Euonymus alatus*)
- Privet (*Ligustrum spp.*)
- Amur Honeysuckle (*Lonicera mackii*)
- Morrow's Honeysucke (*Lonicera morrowii*)
- Tartarian Honeysuckle (*Lonicera tatarica*)
- Japanese Honeysuckle (*Lonicera japonica*)
- Common Buckthorn (*Rhamnus cathartica*)
- Glossy Buckthorn (*Rhamnus frangula*)
- Multiflora Rose (*Rosa multiflora*)
- Asiatic Bittersweet (*Celastrus orbiculatus*)

"Hands-on" Wildlife Habitat Management Ideas

Some habitat improvements can be established by planting native trees, shrubs or wildflowers to enhance or diversify food or cover. For example, if it is determined that there is a lack of persistent winter foods on the property ... then a planting of winter persistent shrubs such as winterberry (*Ilex verticillata*) or high bush cranberry viburnum (*Viburnum trilobum*) can benefit wildlife in the winter months. Another example of an enhancement might be to plant some early summer food sources such as: red mulberry (*Morus rubra*) or high bush blueberry (*Vaccinium corymbosum*). Planting of wildflowers or creating unmowed lawn areas can help attract butterflies, hummingbirds and grassland birds and mammals.

The students can also build nest boxes for bluebirds, house wrens, black-capped chickadees, gray squirrels, and screech owls, to mention a few. They should be built to specifications and then placed into appropriate habitats. The students should be able to recognize the need for some wildlife to find dead or decaying trees for part of their habitat requirements and that artificial nest boxes are mimicking the natural cavities found on the landscape.

The students can construct brushpiles using cut brush (invasive exotic plants (autumn olive, Norway maple) from cleared areas or gather fallen limbs. They may also gather used real Christmas trees and pile them up in an area. They can learn about the importance of wildlife cover and how to provide it.

Practical Wildlife Censusing Techniques

Counting or documenting the presence or absence of wildlife along the nature trail can be both fun and educational for the students. It also teaches the importance of record keeping and identification of wildlife (directly and indirectly).

- Locate nests and other important wildlife occurrences
    - seasonally locate nests and plot locations on maps
    - find den trees and natural cavities and find out what animal is using it
- Owl hooting survey
    - play an owl hooting tape and listen for response
- Bird count
    - learn to identify birds by sound and vision and document their presence in the spring, summer, fall and winter
- Snow tracking
    - following a light snow (2 - 3 inches), animal tracks can be identified and followed to see where they are traveling to and from. Also, students may detect what the animal may be eating or doing.

Other Considerations and Conclusions

A trail developed through a wetland area near the Quaker Farms Elementary School could be valuable in showing students the importance of wetlands and help them see the type of vegetation and conditions of a wetland. A wetland trail system, however, should not criss-cross the entire property because wildlife need places where they can avoid constant disturbance from hikers. This is especially important during the nesting season. Hikers should be encouraged to stay on well marked trails and to avoid blazing additional unauthorized trails.

These are only a handful of techniques and ideas for the nature trail and outdoor classroom. Further consultation and further technical assistance is available from the Team wildlife biologist upon request. A visit to Sessions Woods Wildlife Management Area on Route 69 in Burlington may be valuable to observe existing nature trails, signage, and habitat enhancement demonstrations (tel. 860-675-8170).

Literature Cited

Brown, T. L., and C. P. Dawson, and R. L. Miller. 1979. Interests and attitudes of metropolitan New York residents about wildlife. Transactions of North American Wildlife and Natural Resource Conference. 44:289-297.

NATURAL DIVERSITY DATA BASE

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

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

Please be advised that this is a preliminary review and not a final determination. A more detailed review may be conducted as part of any subsequent environmental permit applications submitted to DEP for the proposed site.

ARCHAEOLOGICAL REVIEW

A review of the State of Connecticut Archaeological Site Files and Maps shows no known archaeological resources in the project area. No National Register-eligible historic or architectural resources are located on Great Oak Road, which connects the town's elementary and middle schools. Considering the immediate proximity of the proposed outdoor living classroom between the two schools, their associated athletic fields and parking areas and an existing well head, it would appear that the area probably possesses minimal archaeological sensitivity. Although the knoll area of the classroom is in an oak and hickory stand of undisturbed land, the likelihood of an archaeological site is low.

Nonetheless, the outdoor classroom does possess the potential for an archaeology lesson. The Office of State Archaeology has curriculum information on the teaching of archeology in elementary schools. They would be pleased to work with any teachers in developing programs suitable for Quaker Farms students. Please contact the Office of State Archeology for further information (860-486-5248).

APPENDIX

Description of Project
Plant Materials

QUAKER FARMS ELEMENTARY SCHOOL

OUTDOOR LIVING CLASSROOM

1. Create four natural shaped individual outdoor classrooms for individual classes.

2. Create one large natural shaped outdoor classroom in center for group studies etc.

3. Create natural pathways going to each outdoor classrooms.

4. Create natural stairway at entance for a safe way to get into outdoor living classrooms using stone on site.

5. Create natural stonewall to keep children from falling down bank.

6. Install plant materials along pathways and classroom areas.

7. Install Butterfly houses , Butterfly log piles , Bird houses , Brush piles and install a Water bog.

8. Install Sugar Maple grove.

9. Remove trees and brush to create outdoor living classrooms. (leave log to be used for Sugar house for firewood)

10. Plant bank along parking lot with Conifers , Perennials ,Shrubs and Friut trees to give a nice look all times of the year and to attract wildlife.

This should give QUAKER FARMS ELEMENTARY SCHOOL a good start on there Outdoor Living Classroom so they will be able to add to this project for years to come and learn about wilflife.

Plant Materials

PERENNIALS

Astilbe
Bleeding Hearts
Day lily
Hosta
Iris
Dead Nettle
Litris
Leopard Plant
Bee Balm
Ferns
Lungwort
Black-eyed Susan
Vinca
Myrtle

TREES

Birch
Eastern Redbud
Crab Aplle
Friut trees
Conifers (Pines)
Sugar Maples

ROCK PLANTS

Anemonella
Viola
Verna
Salix Reticulanta
Phlox
Sedum

BULB

Hyacinth
Lily
Crocus
Lily of the Valley
Amaryillis
Daffodil
Tulip
Lutescens

SHRUBS

Barberry
Butterfly Bush
Cotoneaster
Blue Berry
Dwaf Burning Bush
Black Berry
Forsythia
Fire Bush
Holly
Mountain Laurels
Azaleas
Viburnum
Rhododendrons

BUTTERFLY HOUSES
BUTTERFLY LOG PILES
BIRD HOUSES
BRUSH PILES
BOG AREA

More Plant Materials may be used , depending how much sun light we create in this area

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, soil scientists, foresters, climatologists and landscape architects, recreational 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 - an 83 town area serving western Connecticut.

As a public service activity, the Team is available to serve towns within the King's Mark RC&D Area - **free of charge.**

Purpose of the Environmental Review Team

The Environmental Review Team is available to assist towns in the review of sites proposed for major land use activities or natural resource inventories for critical areas. For example, the ERT has been involved in the review of a wide range of significant land use activities including subdivisions, sanitary landfills, commercial and industrial 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 site and highlighting opportunities and limitations for the proposed land use.

Requesting an Environmental Review

Environmental reviews may be requested by the chief elected official of a municipality or the chairman of an administrative agency such as planning and zoning, conservation or inland wetlands. Environmental Review Request Forms are available at your local Soil and Water Conservation District and through the King's Mark ERT Coordinator. This request form 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 the purposes of a review and a statement identifying the specific areas of concern the Team members should investigate. When this request is reviewed by the local Soil and Water Conservation District and approved by the King's Mark RC&D Executive Council, the Team will undertake the review. At present, the ERT can undertake approximately two reviews per month depending on scheduling and Team member availability.

For additional information regarding the Environmental Review Team, please contact the King's Mark ERT Coordinator, Connecticut Environmental Review Team, P.O. Box 70, Haddam, CT 06438. The telephone number is 860-345-3977.