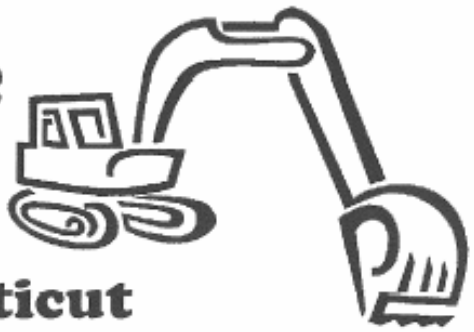
Kobyluck Brothers, LLC
Gravel Excavation



Canterbury, Connecticut

Eastern Connecticut Environmental Review Team Report

Eastern Connecticut
Resource Conservation and Development Area, Inc.

Kobyluck Brothers, LLC
Gravel Excavation
Canterbury, Connecticut

Environmental Review Team Report

Prepared by the
Eastern Connecticut Environmental Review Team
of the Eastern Connecticut
Resource Conservation and Development Area, Inc.

for the
Inland Wetlands and Watercourses Commission
Canterbury, Connecticut

August 2004

Report No. 584

CT Environmental Review Teams
1066 Saybrook Road, P.O. Box 70
Haddam, CT 06442
(860) 345-3977

ACKNOWLEDGMENTS

This report is an outgrowth of a request from the Canterbury Inland Wetlands and Watercourses Commission to the Eastern Connecticut Conservation District (ECCD). The ECCD referred this request to the Eastern Connecticut Resource Conservation and Development Area (RC&D) Executive Council for their consideration and approval. The request was approved and the measure reviewed by the Eastern Connecticut Environmental Review Team (ERT).

The Eastern Connecticut 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 Tuesday, May 18, 2004.

Karen Leonard Allen	Stormwater Permit Engineer DEP - Water Resources Division (860) 424-3842
Nicholas Bellantoni	Connecticut State Archaeologist UCONN - CT State Museum of Natural History (860) 486-5248
Sean Cyr	Environmental Science Student Quinebaug Community College

Scott Gravatt	District Director Eastern Connecticut Conservation District (860) 774-8397, Ext. 203
Robin Lemieux*	Resource Assistant DEP - Wildlife Division (860) 675-8130
Alan Levere	Wetland Reviewer DEP - Environ. & Geog. Information Center (860) 424-3643
Dawn McKay	Biologist/Environmental Analyst III DEP - Environ. & Geog. Information Center (860)424-3592
Kenneth Metzler	Botanist DEP - Environ. & Geog. Information Center (860) 424-3585
David Poirier	Archaeologist CT State Historical Commission (860) 566-3005
Sherwood R. Raymond	Service Forester DEP - James L. Goodwin State Forest (860) 455-0699
Randolph Steinen	Emeritus Professor UCONN - Department of Geology and Geophysics (860) 486-4435
Eric Thomas	Thames Watershed Coordinator DEP - Water Bureau - Planning & Standards (860) 424-3548
Julie Victoria	Wildlife Biologist DEP - Franklin Swamp Wildlife Management Area (860) 642-7239

Judy Wilson — Wildlife Biologist
DEP - Sessions Woods Wildlife Management Area
(860) 675-8130

**Written in consultation with Judy Wilson*

I would also like to thank Mary Ann Chinatti, acting inland wetland agent, John Tetreault, inland wetlands and watercourses commission chairman, Donald Aubrey, town engineer, Robert and Raymond Coughlin, landowners, and others attending 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 plans and additional information. 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 town and landowners. This report identifies the existing resource base and evaluates its significance to potential and existing development, and also suggests considerations that should be of concern to the town and landowners. The results of this Team action are oriented toward the development of better environmental quality and the long term economics of land use.

The Eastern Connecticut RC&D Executive Council hopes you will find this report of value and assistance in the reviewing this proposed sand and gravel excavation.

If you require additional information please contact:

Elaine Sych, ERT Coordinator
CT ERT Program
P. O. Box 70
Haddam, CT 06438
(860) 345-3977

TABLE OF CONTENTS

INTRODUCTION

Introduction

The Canterbury Inland Wetlands and Watercourses Commission has requested assistance from the Eastern Connecticut Environmental Review Team in conducting a review of a proposed sand and gravel excavation.

The parcel is located on Butts Bridge Road adjacent to the Quinebuag River. The plan for the 25.63 acre site is to excavate 396,500 cubic yards of material from 12.67 acres. The site presently forested and contains 5.7 acres of wetlands. No disturbance, filling or excavation is proposed within the 50' regulated area.

There is an adjacent ±14.63 acre parcel that is an approved gravel excavation. This parcel is proposed to be combined with the 25.63 acre parcel into a single excavation site with access and egress onto Butts Bridge Road via the 25.63 acre parcel.

Objectives of the ERT Study

The Canterbury Inland Wetlands and Watercourses Commission is concerned with the hydrology of the area and the impacts on the area wetland systems in the long term. The area contains a unique wetland

system of an Atlantic white cedar swamp and bog. The commission is seeking opinions and guidance on the potential impacts the proposed excavation could have on the area. Specific areas of concern include: long term and seasonal impacts to wetland systems; stormwater management; wildlife habitat impacts and vegetation impacts.

The ERT Process

Through the efforts of the inland wetlands commission this environmental review and report was prepared for the Town of Canterbury.

This report provides an information base and a series of recommendations and guidelines which cover the topics requested by the commission. Team members were able to review maps, plans and supporting documentation provided by the town and 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
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 Tuesday, May 18, 2004. Some Team members may have made separate or additional site visits to the area.

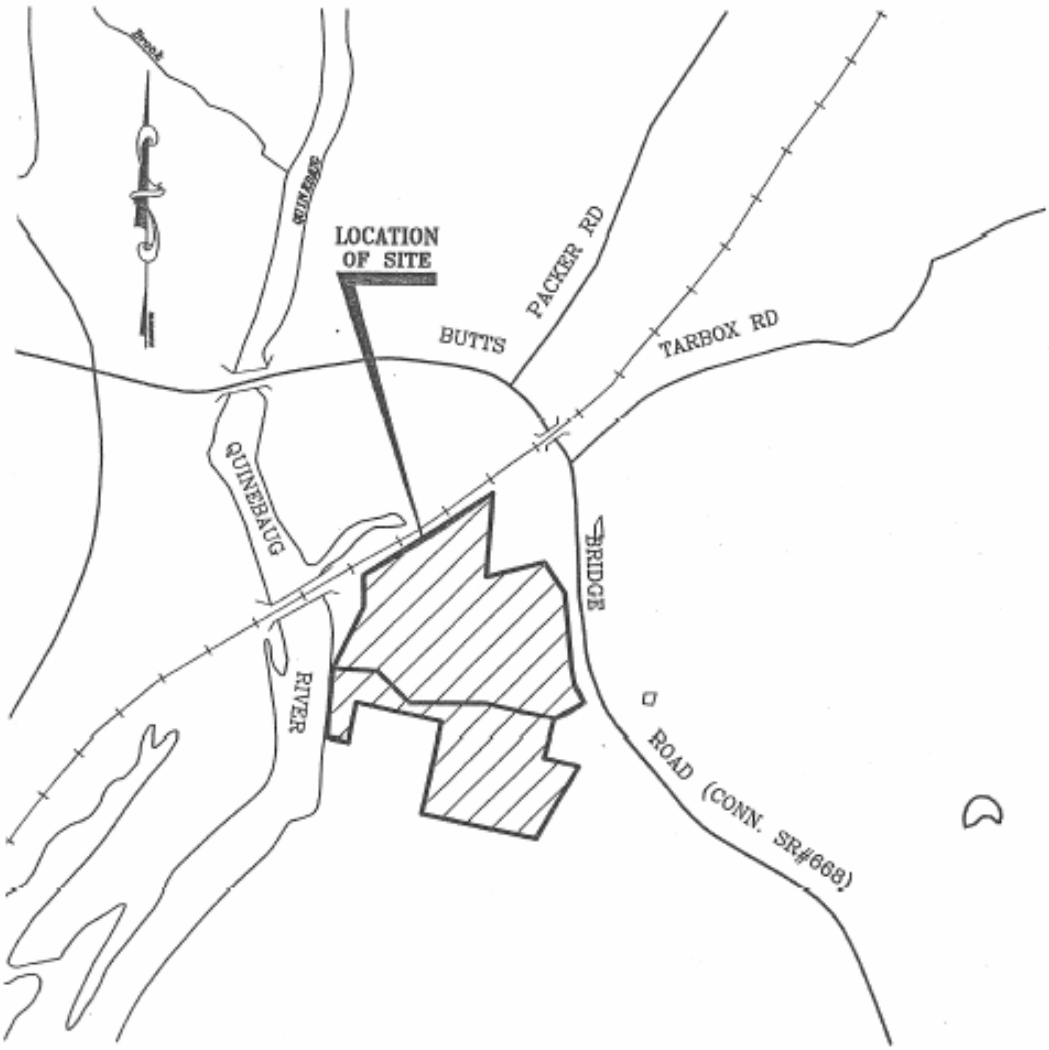
The emphasis of the field review was on the exchange of ideas, concerns and recommendations. Being on site allowed Team members to verify information and to identify other resources.

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.

⇑
N

Location Map

Scale 1" = 1000'

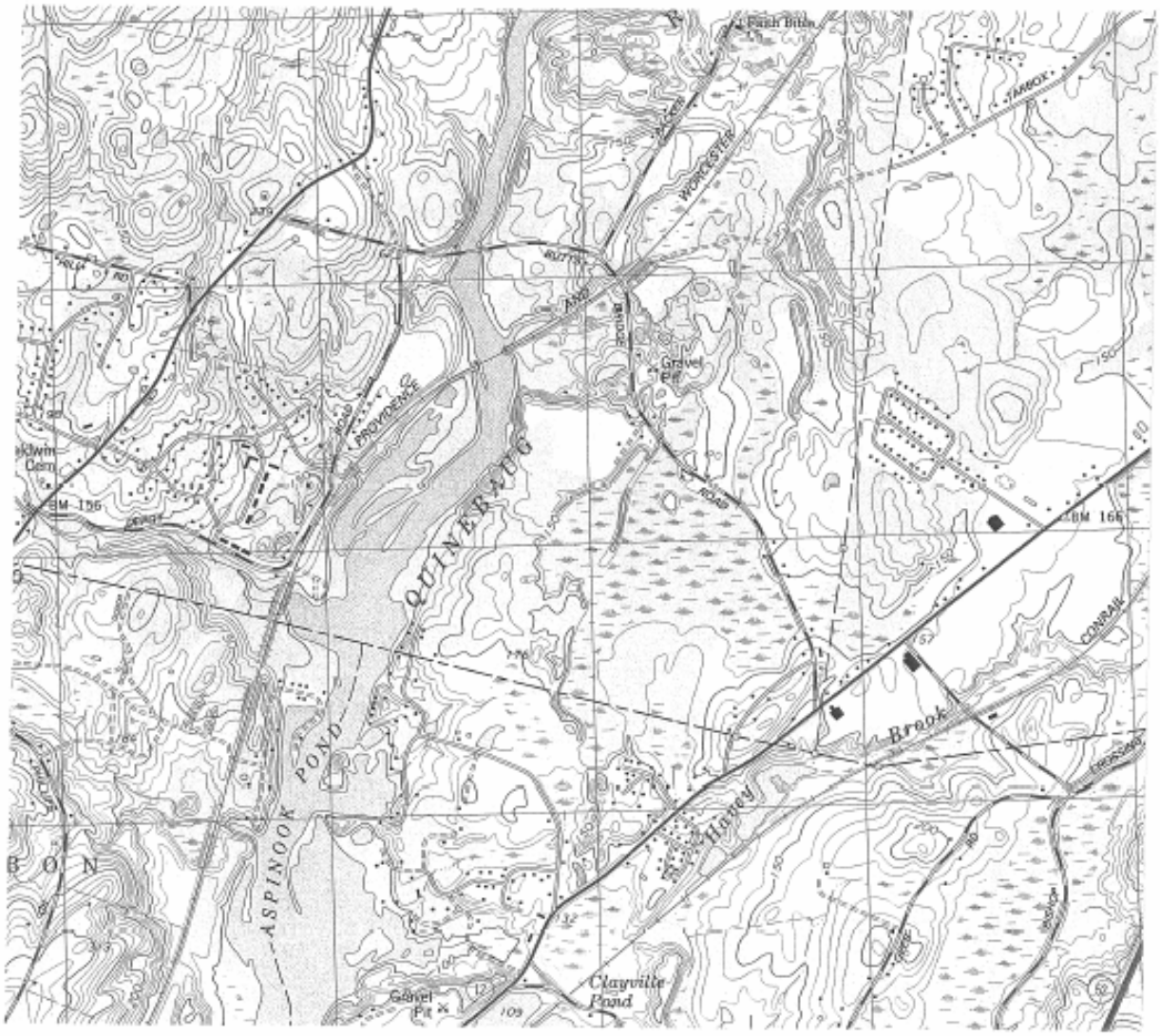


Topographic Map

Scale 1" = 2000'

⇑

N



Soils Map

Scale 1" = 1320'

⇑
N

TOPOGRAPHY AND GEOLOGY

Kobyluck, Inc. currently operates a gravel excavation in Canterbury, CT, and proposes to expand their operation northward onto the adjoining property which they intend to purchase. Their current operation mines gravel from an ancient delta that formed in a lake that filled part of the Quinebaug River Valley during the end of the last Ice Age, about 14,000 years ago. The expanded operation will mine gravel that was part of the same deltaic system, but a part that was closer to the glacial ice-front and, indeed, was deposited on top of left over ice that had not yet melted.

The top of a delta is normally flat and rather even. Thus, the topography of the parcel currently being mined was a flat plain graded to a lake level that had an elevation of ~160' above sea-level. The elevation of the delta top deposit is slightly greater than 160 feet to the north and diminishes southward. That portion of the delta deposited on top of ice has an irregular topography that was created when the buried ice finally melted and the gravel collapsed into the space formerly occupied by the ice. The topography of the parcel into which expansion is planned is hummocky and contains at least one kettle. The transition between the delta deposited on top of stagnant ice and the rest of the delta is abrupt; it is a fairly steep north-sloping hill which is referred to as the "head of outwash" by geologists who mapped the area (Stone and Randall, 1978). Stone and Randall recognized several heads of outwash

in the Plainfield Quadrangle and were able to map the episodic melt-back to the Ice Age Glacier (see map).

During the last Ice Age, glaciers covered New England, extending to the south shore of Long Island, through Block Island, Martha's Vineyard and Nantucket. The ice reached a thickness of a kilometer or two in Canterbury. Ice that thick deforms under its own weight (like silly putty). Such deformation manifests itself as flowage of the glacial mass from north to south (actually south-southeast in Canterbury). As the glacier ground southward, it eroded masses of the bedrock that it rode over, creating abundant clay, sand and gravel that became frozen into the ice sheet and formed deposits of till beneath the glacier and sand and gravel deposits when the glacier melted.

During the melt back of the glacier, the Quinebaug River Valley became blocked near Jewett City by remnant blocks of ice buried in sand and gravel. A temporary lake was impounded by the debris and provided the environment for delta deposition at edge of the melting ice as melt-water streams entered the impoundment. Water power is proportional to water velocity and hence turbulent, fast-moving melt-water streams are able to transport coarse sand and gravel on their bed. When the stream enters a body of standing water (lake) the velocity drops, approaching 0. The coarsest gravel is deposited immediately where the stream enters a lake; the sand is carried farther into the lake. This forms a lobate underwater surface that gradually progrades into the lake. The surface of each lobe is steeply inclined (about 30°) and gets progressively deeper farther into the lake. Mud is transported far into

the lake and settles to the bottom of the lake. A delta will gradually fill in any lake or pond that is small enough. Gravel was deposited as river plain sediment on top sand which accumulated as inclined (about 30°) beds on the lobes of the delta. The sand was deposited on top of more flat lying mud deposited on the lake bottom. This very same sequence of beds was viewed in the active quarry: coarse, near horizontal gravel deposits at the top, inclined coarse sand deposits beneath, and flatter fine sand and silt deposits at the bottom of the quarry. The inclination of sand beds indicates that the delta was deposited from southerly flowing melt-water streams. The beds in the proposed expansion will likely be deformed by collapse into the holes left by melting of underlying ice.

Sand and gravel are very porous and permeable and make excellent aquifers. High permeability produces a relatively flat water table. The applicant's maps show the water table is inclined gently away from the valley walls. To protect the existing water table configuration care must be taken to maintain the level of the quarry floor above the water table elevation during the excavation. If the land is to be reclaimed for residential use after the gravel is mined out, the level of mine floor should be left two meters (~6') above the water table so as to allow for installation of working sanitary septic systems.

Reference

Stone, B.D., and Randall, A.D., 1978, Surficial geologic map of the Plainfield Quadrangle, Windham and New London Counties, Connecticut. U.S. Geol. Surv. Map GQ-1422.

Geology Map

⇑

Approximate zero-edge of sand and gravel deposits (from Stone and Randall, 1978)

Inferred southern edge of stagnant ice margin during episodic melting of ice sheet (see Stone and Randall, 1978).

A WATERSHED PERSPECTIVE

These comments and recommendations to the Town of Canterbury are provided in the perspective of improving water quality and maintaining and supporting designated uses of the waters of the State in accordance with Connecticut's *Water Quality Standards*. Addressing water quality concerns and relevant water resources within a watershed management plan framework takes into account the cumulative impacts of numerous activities within a given watershed that may affect water quality and/or quantity.

The *Water Quality Classifications*, based on the adopted Water Quality Standards, establish designated uses for surface and ground waters and identify the criteria necessary to support those uses. The Standards and Classifications are designated to manage water quality to protect health, the environment, and legitimate uses of water resources. The complete State of Connecticut Water Quality Standards and Criteria document is available on the CTDEP website at: http://www.dep.state.ct.us/wtr/wq/wqs.pdf.

The following recommendations may overlap with those of other ERT members who are dealing with more specialized aspects of the review (i.e. wildlife habitat, historic/archaeological significance, wetlands, stormwater erosion and sedimentation control, etc.). In such cases, these

recommendations are meant to support or supplement these specialized reviews, not to supplant them

Proposed Project Description

The plan for the 25.63 acre site is to excavate nearly 400,000 cubic yards of gravel over 12.67 acres. This proposal is for a parcel that is adjacent to a 14.63-acre parcel with an approved gravel extraction operation on Butts Bridge Road. The proposal combines the two parcels into a single gravel excavation with access onto Butts Bridge Road from the 25.63-acre parcel. The proposed sand and gravel excavation, a three-phase project, will greatly modify the terrain from a rolling topography of mostly forested sandy glacial outwash (with stratified deposits of sand and gravel), complete with some steep slopes and small ridges, to an irregularly shaped area with steep slopes (proposed cuts of 10 -15 feet in places) to a concave shape with the perimeter of the excavation area remaining higher than the interior. This is proposed to assist in the control of erosion and sedimentation and on-site stormwater recharge during the sand/gravel excavation process. The majority of upland area wildlife habitat adjacent to the wetlands will be eliminated. There appear to be no perennial or intermittent streams on the site that discharge to the wetlands or to the Quinebaug River.

Water Quality Classification

The Quinebaug River (Regional Drainage Basin #37) is located in south central Massachusetts and northeastern Connecticut. It has approximately a 740 square mile watershed, is approximately 62 miles long, before discharging to the lower Shetucket River, which then flows south to Norwich Harbor and the upper Thames River estuary. The sand and gravel excavation site is located in the lower third of the Quinebaug River watershed, with approximately a 600 square mile watershed above the review site.

The surface water quality classification for the Quinebaug River is Class B. All surface water tributaries in the area are designated as Class A. Class A surface waters have the following designated uses: habitat for fish and other aquatic life and wildlife; potential drinking water supplies; recreation; navigation; and water supply for industry and agriculture. Class B designated uses are identical to Class A designated uses, except that they do not include potential drinking water supplies.

The ground water quality classification around the site is Class GA. The Class GA classification includes the following designated uses: existing private and potential public or private supplies of water suitable for drinking without treatment; and baseflow for hydraulically connected surface water bodies.

Water Supply Assessment/Management

The review site lies nearly adjacent to a mapped potential high-yield aquifer resource, nearly adjacent to this site parallel to the east shores of this Quinebaug River corridor segment. The Town of Canterbury (along with abutting Plainfield, Griswold and Lisbon) can work proactively towards dedicating such land in/adjacent to critical aquifer areas to (future) water supply use, thus providing the greatest degree of groundwater protection. Any land in the within the aquifer recharge area that can be controlled in a proactive way represents a net reduction in potential risk to the water supply. Often land within critical aquifer areas can also help meet other open space needs of the community - such as greenway, preservation of natural areas, and protection of water quality of rivers. As the Town of Canterbury's Plan of Conservation and Development begins a revision process, the community should develop a plan of conservation of open space, with protection of significant aquifers as one of its criteria for acquisition of land.

Aquifer Resources

Aquifer Protection Areas (APAs) are also commonly referred to as wellhead protection areas. These APAs were delineated by the water utilities, and represent the area of groundwater contribution for active public water supply wells or well fields serving more the 1,000 people that are set in stratified drift deposits. The Department of

Environmental Protection has adopted regulations which provide the minimum standard for land use regulations to be adopted by each municipality within which an Aquifer Protection Area falls. The regulations prohibit development of new high-risk land use activities that use hazardous materials, and will require existing high-risk land use activities that use hazardous materials to register and follow best management practices. The proposed land use regulations received approval of the Legislative Regulations Review Committee on January 27, 2004, and were filed with the Secretary of State's office on February 2, 2004. Filing with the Secretary of State was the final step in the adoption process, and establishes the effective date of the land use regulations. There are no established APAs in close proximity to this Canterbury review site. The closest APA area is located southeast of the in the center of Plainfield for the Gallup wellfield owned by Gallup Water Services, Inc.

Water Quality Assessment

To determine whether the State's surface water resources are meeting designated uses, CTDEP monitors or collects samples from selected water bodies throughout the state. Generally, water quality is assessed based on the following three uses: fish consumption, aquatic life support, and primary contact (i.e. direct exposure) for recreation. The degree to which the water body is suitable for that use is assigned one of the following use support descriptors: fully supporting, threatened (fully supporting but threatened by impairment), partially supporting, not supporting, not attainable or not assessed. The degree to which these

different uses are supported by the water body determines the "overall use support." This information is submitted as a Water Quality Report to Congress. The 2004 *Report* is available on the CTDEP website at: http://www.dep.state.ct.us/wtr/wq/305b/305b_index.htm.

Water Quality Issues of Concern

The site under review is adjacent to a 6.4 mile Quinebaug River segment (CT3700-0-03) that is currently unassessed with current water quality data. It has a Threatened status due to the proximity of the Yawarski landfill along this river segment. This is a CTDEP trout-stocked river, which infers that it can support a seasonal recreational trout fishery. It also is included in the statewide fish consumption advisory. The entire Quinebaug River main stem within Connecticut borders has been included in the CTDEP's Water Quality Monitoring and Assessment program. There are multiple stressors on the river that are degrading designated uses, including excessive productivity fed by high nutrient loads, algal growth, low dissolved oxygen, pH, and widely fluctuating river levels. Several of these river segments are currently included in the *2004 List of Connecticut Waterbodies Not Meeting Water Quality Standards* (also referred to as the Impaired Waters List). The *List is* available on the CTDEP website at: http://www.dep.state.ct.us/wtr/wq/tmdlbrief.htm. The *List* is used by CTDEP as a document to plan and prioritize management activities, including the development of TMDLs. A TMDL is a watershed plan that focuses resources on reducing loads of known pollutants. TMDLs provide the framework to restore impaired waters by establishing the

maximum amount of a pollutant that a waterbody can assimilate without adverse impact to aquatic life, recreation, or other public uses. The TMDL is then divided up between all potential sources of that pollutant. TMDLs are often expressed by the mathematical equation:

TMDL = Point Sources + Nonpoint Sources + Background + Margin of Safety.

The end result of the TMDL process is a Water Quality Management Plan with quantitative goals to reduce pollutant loadings to the impaired waterbody. TMDLs are implemented under the existing authorities of CT DEP and may include both regulatory and voluntary actions as part of a larger Water Quality Management Plan.

The other Quinebaug waterbody segments are targeted for TMDL development within 3 - 5 years. CTDEP and the U.S. Geological Survey are conducting focused investigations of the Quinebaug River and its main tributaries. They have begun to formulate an initial Science Plan that will provide a road map to address the likely multiple point sources and nonpoint sources of pollution with the goal to restore all designated uses for the reach of the Quinebaug River. The Town of Canterbury and other Quinebaug watershed communities will contribute various stakeholder efforts towards realizing that goal. This can be done, in part, by closely reviewing potential water quality impacts associated with land use development proposals such as this sand and gravel excavation proposal.

Decreased Groundwater Storage

A cursory review of the surficial materials map of the site area indicates that the sand and gravel deposits underlying the Kobyluck Brothers site could provide ground water support for the Quinebaug River. This groundwater discharge may support base flow when surface water runoff and precipitation is low. It may also moderate stream temperatures, thereby reducing thermal stress on fish. Removal of the sand and gravel deposits may diminish the quantity of onsite water storage and the associated discharges to the wetlands, pond and streams, consequently affecting water quality and stream habitat. There is a concern for the downstream river impoundment known as Aspinook Pond. Decreases in significant groundwater flow amounts to the Quinebaug River may exacerbate the impaired water conditions of this river impoundment by reducing the amount of high quality water available for dilution. The reduction in groundwater contribution to river flow may also increase the length of residence time within the river impoundment where excessive nutrients and certain physical conditions can lead to excessive algal growth and resulting water quality degradation.

A review of the available documents and site plans did not provide the information needed to fully understand the issues of groundwater connectivity between the existing and proposed gravel excavation areas and associated wetlands and with the adjacent cedar swamp and Quinebaug River. The cedar swamp has a critical hydrologic component need in the subsurface water level, and all efforts should be made to

ensure that no subsurface drainage from the bog wetland takes place during or after completion of the proposed gravel excavation.

It is recommended that the Town require a comprehensive groundwater monitoring and analysis study to ascertain water levels and provide additional information needed to make sound land use decision with regards to areal and vertical extent of the proposed excavation as well as site reclamation and final land use conservation and development plans. Such study should also assess likely changes of ground water levels, if any, and impacts to the wetland soils.

Additional Issues of Concern

This is a sensitive site in terms of geologic, hydrologic, and resultant wildlife and flora resources. There is insufficient technical data provided to assess what adverse impacts the operation may have on these resources.

- Proper use and storage of petroleum products on the site must be very carefully planned for and executed during the permitted phases of the excavation. Where rapidly permeable soils exist, a strong possibility exists for accidental or deliberate spills of such products. In turn, the petroleum product(s) can quickly enter the regional groundwater resource and cause significant environmental pollution, which will likely require a large price tag to properly remediate to the Class GA criteria.

- With the proposed excavation removing substantial surficial materials above the water table, the issue of vertical separation distance is of particular concern. The conceptual future residential development plan included in the development site plan infers individual wells and septic systems that will be located in the legacy of these rapidly permeable soils. If the percolation rate is less than five minutes per inch, there is a public health code requirement to double the vertical separation distance between septic leaching field and top of water table.

- This section will defer most issues concerning erosion and sediment control to other review sections of the report. One point to raise here is the recommendation to institute an open-close-reclaim phasing approach to this excavation site. A minimum of the three proposed phases, and probably additional, smaller footprint phases should be considered, with each permitted phase being reclaimed to Town requirements before the applicant proceeds to the next phase. The cause for concern reflects the existing gravel operation: which apparently has not followed a complete phase approach; lacks the registration of a CTDEP industrial stormwater general permit (see comment in Stormwater review section); and whose owner is currently applying to expand the total operation without assurance that the existing operation will be completed and reclaimed before moving to the proposed excavation area.

- Habitat protection should be a priority goal in the management of the gravel extraction operation. The best form of restoration is habitat

protection. The cost of restoration can be much greater than the cost of habitat protection. The applicant should minimize the risk to habitat by ensuring adequate habitat protection. This section defers to other report sections that focus on identified wildlife, and wetland resources within and adjacent to the project area.

- The review site, adjacent to the Quinebaug River corridor, is identified on the State Conservation and Development Policies Plan 1998 - 2003 Locational Guide Map as a Preservation Area. The state action strategy for Preservation Areas is to foster the identification of significant resource, heritage, recreation and hazardous areas of statewide significance and advocate their protection by public and quasi public agencies in their planning and investment decisions. Further, the strategy is to avoid support for structural development except as directly consistent with the preservation values. The proposed State Policies Plan 2004 - 2009 identifies the site area as a Conservation Area. The state action strategy for such Conservation Area is to plan and manage, for the long-term benefit, the lands contributing to the state's need for food, fiber, water and other resources, open space, recreation, and environmental quality and ensure that changes in use area compatible with the identified conservation values. The site development plan does not reference the State Policies Plan (or the local Plan of Conservation and Development) or provide narrative as to whether the short and long-term development plans are consistent with this Policies Plan. This should be addressed to the satisfaction of the Town Inland Wetlands and Watercourses Commission.

Groundwater Resources

The supplied review packet listed concerns and reason by the Town of Canterbury Inland Wetlands and Watercourses Commission for the ERT request. Among those concerns, and not well defined in the accompanying documents, was an understanding of the hydrology in the area of the sand and gravel excavation site. The following section does not specifically address the hydrologic connections and potential impacts to the area wetland systems. The supplied documents are insufficient to assess the resource or potential impacts. Another report section does review the wetland complex. What the following does provide is some background information about groundwater resources and opportunities for effective resource management by the local land use decision makers.

Groundwater Flow

In an undisturbed watershed, precipitation that falls on the land becomes part of surface runoff. It either returns to the atmosphere by evaporation and evapotranspiration or infiltrates the ground where it recharges groundwater supplies. Most groundwater seeps down to the water-saturated layer, commonly referred to as an aquifer. Perhaps the most significant function of groundwater is its gradual discharge to rivers to maintain streamflow during dry weather periods throughout the year. Sand and gravel excavation pits can affect groundwater flows. Such pits located above the water table (top layer of the aquifer) can

increase groundwater recharge by filtering water into the ground that would have been lost as surface runoff. Excavation pits developed below the water table can intercept groundwater flow and subsequent dewatering activities could lower the water table hundreds of feet away. This would disrupt base flows to lakes and streams, and in turn, alter or destroy fish habitat.

Many substances used at sand and gravel pits, such as lubricants, fuels and oils, are harmful or toxic to fish. In most cases, good housekeeping on the project site, and the proper use, storage and disposal of these substances and their containers can prevent contamination of adjacent waterbodies

Groundwater Flow Management

Sand and gravel excavation areas should be located so they do not draw down nearby wetlands and streams. A detailed knowledge of the discharge areas in nearby streams and wetlands, the amount of groundwater inflow and its source, and the area of the surrounding water table influenced by dewatering is necessary to design operational plans to prevent damage to fish and other aquatic resource habitats. In dewatering operations, the settling pond system should have a large enough capacity to hold water from the operation itself, as well as from precipitation and its associated runoff. This will allow sufficient time for settling suspended solids and prevent water from overflowing the ponds and eroding channels.

Excavations should occur above the highest determined upper level of the water table. This will avoid flooding problems that could otherwise occur, as groundwater levels fluctuate from season to season. Ideally, excavation pit floors should be at least five feet above the seasonally high water table level.

Whenever possible, topsoil, subsoil and overburden should be handled separately. Topsoil should be selectively removed and stored for use during site rehabilitation. Overburden and topsoil stockpiles should be situated where they will not interfere with natural drainage and surface flow or erode into adjacent waterbodies.

Sand and gravel washing operations require significant quantities of water. Most often, the source of water used for the washing operation is a lake or stream adjacent to the excavation pit. The contractor must ensure that the amount of water removed from the lake or stream for the washing operation does not jeopardize the aquatic resources. In Connecticut, if the proposed combined gravel excavation operation results in the diversion of more than 50,000 gallons of surface or ground water in a 24-hour period, then a water diversion use permit may be required from CTDEP. More information on the permit process can be found on the CTDEP website at:
http://www.dep.state.ct.us/pao/iwrdfact/waterdiv.htm.

Groundwater Protection

Sand and gravel excavation areas should be worked at a level less than five (5) feet above the average seasonally high water table. The documents provided to reviewers indicate at one point the maintenance of a minimum four feet of materials above the water table, and on the site plan drawings, a range of bottom elevations of 2 - 5 feet above the water table elevation. The Town of Canterbury could consider flexibility to allow the excavation area pit to be worked at a level not less than two (2) feet above the average seasonally high water table with the following guidance:

- refueling facilities and procedures are implemented that will provide reasonable protection of the groundwater;
- a spill prevention control and counter measure plan is implemented; and
- plans for conditions a and b above are submitted to and approved by the appropriate Town of Canterbury land use commissions.

Additional information can be found in the CTDEP Bulletin No.26, "Protecting Connecticut's Groundwater: A Guide For Local Officials," Hartford, CT. 1997.

Additional basic resource information is provided below on floodplains and management considerations. The site under review is relatively removed from the active floodway and fringe where the greatest flood management concerns are generally raised. However, this information

may prove useful in the context of watershed planning considerations with this site application.

Floodplains

Floodplains are the relatively low areas adjacent to rivers, lakes, and oceans that are periodically inundated when water flows over the banks of rivers and streams or beyond the shores of lakes and oceans. They are part of the natural water system: their function is to help carry and store riverine floodwaters or to dampen the energy of coastal storms.

Throughout time, floods have shaped the floodplain landscape. Forces of water are still actively shaping these areas, i.e., being eroded or built up through sediment deposition.

Not only do floodplains have special features that play an important role in our natural environment, they are also the focus of a variety of human activities, including commerce, agriculture, residential, and infrastructure. The natural and human environments in the floodplain constantly interact, and often adversely affect, their respective uses.

Development in Floodplains

Riverine floodplain development has a direct impact on flooding dynamics. Construction and regrading of the floodplain can obstruct or divert water to other areas. Filling reduces the floodplain's ability to

store excess water, sending more floodwater downstream and causing floodwater to rise to higher levels. This also increases velocity of floodwater.

Development in riverine watersheds affects the runoff of stormwater. Buildings and parking lots replace the natural soil and vegetation that otherwise would absorb water. While in a natural setting, as much as ninety percent of the rain will infiltrate the ground; in an urbanized area, only 10 percent may infiltrate the ground and as much as ninety percent will run off.

Storm sewers, and man-made ditches that come with urban drainage systems, speed the velocity and timing of flood flows. The result of urbanization is that there is more runoff in the watershed and it moves faster, potentially increasing flooding downstream.

Natural Resources of Floodplains

Floodplain lands and adjacent waters combine to form a complex, dynamic physical and biological system found nowhere else. Natural or relatively undisturbed floodplains:

- Limit flooding naturally by temporarily storing floodwater
- Maintain water quality by filtering sediments, nutrients, and impurities
- Preserve and recharge groundwater supply

- Support natural vegetation
- Provide fish and wildlife habitat
- Allow for linear wildlife corridors (e.g. Quinebaug Wildlife Management Area)
- Provide many kinds of recreational opportunities
- Contain places for outdoor education and scientific study

When portions of floodplains are left in or restored to a natural state, they provide a wide variety of benefits to both human and natural systems. These benefits take many forms: some are static conditions (such as providing aesthetic pleasure) and some are active processes (such as reducing the number and severity of floods, helping handle stormwater runoff and minimizing non-point sources of water pollution). By allowing floodwater to slow down, sediments settle out, thus maintaining water quality.

The natural vegetation filters out impurities and uses excess nutrients. Use of natural processes costs far less than it would take to build facilities to correct flood, stormwater, water quality and other community problems.

The natural resources of floodplains can be grouped into three general categories: water resources, living resources, and societal resources. Within each category are a number of natural and beneficial functions.

Water Resources and Functions:

Natural Flood and Erosion Control

- provide flood storage and conveyance
- reduce flood velocities
- reduce sedimentation

Water Quality Maintenance

- filter nutrients and impurities from runoff
- process organic wastes
- moderate temperature fluctuations

Groundwater Recharge

- promote infiltration and aquifer recharge
- reduce frequency and duration of low surface flows

Living Resources and Functions:

Biological Productivity

- support a high rate of plant growth in floodplains
- maintain biodiversity
- maintain integrity of ecosystems

Fish and Wildlife Habitats

- provide breeding and feeding grounds
- create and enhance waterfowl habitats
- protect habitats for rare and endangered species

Societal Resources and Functions:

Harvest of Wild and Cultivated Products
- enhance agricultural lands
- provide open space
- restore and enhance forest lands

Recreational Opportunities
- provide areas for active and passive uses
- provide open space
- provide aesthetic pleasure

Areas for Scientific Study and Outdoor Education
- contain cultural resources (historic, archeological sites)
- provide opportunities for environmental, other studies

These natural resources and functions can increase a community's overall quality of life. This role has been under-valued all too frequently in the past. Substantial gains can be made by transforming stream and river floodplains from problem areas into value-added community assets. Parks, bike paths, open spaces, wildlife conservation areas, and aesthetic features are important quality-of-life issues to today's citizens. Assets like these make the community more appealing to potential employers, investors, residents, property owners, and tourists.

Floodplain Management and Floodways

For purposes of the Federal Emergency Management Agency (FEMA) National Flood Insurance Program (NFIP), the area that would be inundated by the 100-year base flood is called the "Special Flood Hazard Area" of the 100-year floodplain. The 100-year floodplain is composed of two areas: the floodway and the flood fringe. The **floodway** is the stream channel and that portion of the adjacent floodplain that must remain open to permit the passage of the base flood. Floodwaters generally are deepest and swiftest in the floodway. Anything located in

this area is in the greatest danger during a flood. The remainder of the floodplain is called the **flood fringe,** where water may be shallower and slower moving. Buildings, structures, the placement of fill and other development activities placed within the floodway are most likely to obstruct flood flows, causing the water to slow down and back up, resulting in higher flood elevations.

The community officially adopts its "regulatory floodway" in the floodplain management ordinance or regulation. The **regulatory floodway** is defined as the channel of the watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot (or a lower height designated by the community). All projects in the regulatory floodway must undergo an encroachment review to determine their effects on flood flows and ensure that they do not cause problems.

Communities must regulate development in the floodway to ensure that there are no increases in upstream flood elevations. Most municipalities adopt only the minimum NFIP standards. According to minimum NFIP requirements, within the regulatory floodway, communities must prohibit any encroachments, including fill, new construction, substantial improvements, and other developments unless it has practices that the proposed encroachment would not result in any **(0.00 feet)** increase in flood levels within the community during the occurrence of the base flood discharge. It is recommended, however, that floodway developed be discouraged or even prohibited because of the hazardous nature of

this area. CT DEP does provide guidance to communities interested in strengthening their local floodplain regulations. A Floodplain Management publication will soon be published by CTDEP. The target audience includes municipal land use planners and commissioners. For more information, call the CTDEP Inland Water Resources Division at (860) 424-3019.

The floodway and flood fringe are depicted on a community's Flood Insurance Rate Map (FIRM). They should be depicted within the development site plan. This will allow for appropriate review and assessment of potential impacts by the development proposal on the floodplain.

There is a narrative note (General Note No. 6) that indicates the site is located in a Zone C as shown on the FIRM, Town of Canterbury, CT, Panel 26 of 30, dated October 16, 1984. However there is no map depiction of the Zone C or interpretive narrative associated with this ERT review that indicate the floodway or flood fringe associated with the Quinebaug River adjacent to the existing and proposed gravel excavation areas.

A revised site plan should include spatial map depiction of the Zone C area, as well as the other Zones north of the railroad tracks, and an interpretive narrative for land use commissioners. A narrative is provided here for consideration: Zone C is a flood insurance rate zone that correspond to an area outside the 100-year floodplains, an area of 100-year sheet flow flooding where average depths are less than 1 foot, an area of 100- year stream flooding where the contributing drainage

area is less than 1 square mile, or areas protected from the 100-year flood by levees. No Base Flood Elevations (BFEs) or depths are shown within this zone. Zone C is an area of minimal to moderate flood hazard (where flood insurance is available but not required by federally regulated lenders). This zone is usually depicted on FIRMs as above the 500-year flood level of the primary source of flooding. C Zones may have local, shallow flooding problems.

Additional water resource management information is provided below. As long-time community residents remember the past flooding events (including a major flood that occurred along the Quinebaug River in August 1955) and resultant damage caused along many major rivers and coastline areas of Connecticut. The U.S. Army Corps of Engineers dams that were built in the upper Quinebaug and French Rivers in southcentral Massachusetts and in Thompson, Connecticut reduce flooding along the Quinebaug River in Canterbury. No SCEL designations are established for this lower portion of the Quinebaug River, but do exist further upstream in the watershed.

Stream Channel Encroachment Line (SCEL) Program

The statewide SCEL program emerged from the disasters associated with the 1955 flooding events where unwise land use wreaked havoc on overdeveloped floodplain areas throughout the state.

The SCEL program is a nonstructural element in the State's ongoing efforts to reduce the loss of life and property from flooding events. Connecticut General Statutes (CGS) Sections 22a-342 through 22a-349a authorized the SCEL program.

270 miles of the State's most flood prone rivers are now regulated under this program. This program is administered to assure that floodplain development is compatible both structurally and hydraulically with the flood flows expected in the rivers. The SCEL permit can be either an individual or general permit issued by CT DEP. Individual permits are issued directly to an applicant, whereas one or more applicants issue general permits to authorize similar minor activities. In making a decision on a SCEL permit application, the CT DEP must consider the impact of the proposed activities in the floodplain environment, including wildlife and fisheries habitats and on the hazards posed to people and property. Permits to develop within these areas are granted by CT DEP only if it can be clearly demonstrated that no increase in flood hazard or other adverse consequences will result upon completion of the development. Additionally, major repair of structures that existed before the SCELs were established may require a permit.

The actual encroachment lines delineate the limits of State authority. In general, they roughly outline the limits of the riverine floodplain. However, certain backwater areas that flood, but don't contribute significantly to the conveyance of the flood flows in many cases were

omitted from regulation. State encroachment lines usually encompass the outer floodplain limit as well as the critical floodway in the river.

No SCEL has been established for the Quinebaug River at this proposed project area. SCELs are established further up the watershed on the Quinebaug River in the Town of Putnam, and on the French River in Thompson.

Vegetated Buffers For Resource Protection

CTDEP recommends that any new development leave a vegetated strip between the area of disturbance and surface water resources, including wetlands to help protect water quality, and fish and wildlife habitats from nonpoint source pollution. Vegetated buffers help trap road sands, contaminants and other pollutants contained in stormwater runoff generated from roadways, parking lots, roof tops, and other impervious surfaces, as well as eroded sediments occurring from natural scour or land moving activities such as site development and other soil disturbances. Vegetated buffers also help moderate the temperature of stormwater runoff, thereby reducing thermal impacts on aquatic wildlife. A 50-foot buffer is typical, but widths can vary immensely depending on such factors as topography, the erosivity of the soil, and the value or sensitivity of the water resource. The CTDEP Fisheries Division recommends a 100-foot buffer along perennial streams such as the Quinebaug River, and a 50-foot buffer along intermittent streams; measured from the upland boundary of the regulated area, including any riparian wetlands. CTDEP Fisheries further recommends that the

buffer remain in a naturally vegetated and undisturbed condition. Riparian wetlands may provide valuable wildlife habitat, flood attenuation, water quality renovation, and groundwater recharge, so it is important to protect these areas from degradation. The applicant should incorporate this riparian corridor buffer guidance into a revised conceptual site reclamation and future site development plan for consideration by Town of Canterbury's land use commissions.

Conclusion

This watershed perspective attempts to link the proposed land use activities, the site specific resources, and some of their interconnections to the larger Quinebaug River drainage basin. The existing and proposed activities of this site development proposal are not singled out to predict negative impacts to the larger watershed. Rather, the linkages are provided to the applicant, and to the Town of Canterbury land use commissions, to underscore the importance of pursuing sound water resource management at the local scale and for the benefit of the region. This may remind the reader of the oft-quoted statement, "A watershed ultimately connects the communities within it through their common dependence on water resources."

STORMWATER REVIEW

Stormwater Permitting - Construction

If the development activities to prepare the site for excavation will involve the disturbance of one or more acres regardless of phasing, the activity must comply with the requirements of Connecticut's *General Permit for the Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities* ("construction general permit"). A registration under the construction general permit is not required if the site development activities will result in the disturbance of between one and five acres regardless of phasing, and the project receives town review and written approval of the erosion and sediment control plan. If there is no town review or if the development activities will result in the disturbance of five or more acres of land regardless of phasing, then the developer must register under the construction general permit.

The materials included with the ERT packet show a conceptual development proposal for nine (9) single family homes. Again this activity must comply with the requirements of the construction general permit and would most likely require the submittal of a separate construction general permit registration.

Stormwater Permitting - Industrial Activity

Mining operations are considered an industrial activity that requires registration under Connecticut's *General Permit for the Discharge of Stormwater Associated with Industrial Activity* ("general permit"). Conditions of the industrial general permit include the preparation of a site-specific and certified Stormwater Pollution Prevention Plan ("Plan") and annual sampling if a discharge of stormwater is generated from the retention basins. In addition to erosion and sediment controls, the Plan must address good housekeeping, vehicle and/or equipment washing, vehicle and/or equipment fueling, spill prevention and response procedures and inspection procedures.

Endangered/Threatened Species

Section 3(b)(2) of the industrial general permit and Section 3(b)(2) of the construction general permit contain the following statement: "Such activity must not threaten the continued existence of any species listed pursuant to Section 26-306 of the Connecticut General Statutes as endangered or threatened and must not result in the destruction or adverse modification of habitat designated as essential to such species." The materials included with the ERT package indicate that a state threatened species, Blue Footed Salamander, and a state endangered species, Eastern Spadefoot Toad, occur in the vicinity of the proposed development site. The activity will obviously impact upland habitat and has the potential to alter local groundwater flow patterns and impact

the wetlands. Therefore, neither permit can be issued until the proposed site activity is shown to be consistent with this requirement of the general permits. Please contact Julie Victoria of DEP Franklin Swamp Wildlife Management Area at 860-642-7239 for further assistance in addressing this issue.

Erosion and Sediment Control Notes

Review of the Excavation and Erosion and Sediment Control Plan (Plan) generated the following comments:

- The Plan shows that each phase will be graded to direct runoff towards the center of the site and into the sediment basins.

- Because of the proximity of the northern Phase 1 clearing limit to the wetland, silt fence must be extended at least another 200 feet east along the northern clearing limit until the new grading is established.

- The Phase 3 wetland non-encroachment boundary line is inconsistent with the Phase 3 limit clearing line and must be clarified.

- Temporary check dams must be installed at intervals along the length of the access road for each phase until the road is stabilized.

- The Plan must include protection of sediment basin side slopes, such as riprap, at the point where the stormwater runoff will enter the basins from each access road.

- The Plan must insure that the outlet slopes of the sediment basins are stabilized to prevent erosion in case the basins do overflow. If existing vegetation is damaged, the outlet slopes must be protected with sodding, riprap or the equivalent.

- The Plan must specify the requirement to clean out the sediment basins as needed to maintain the capacity to store the runoff from a 100-year storm.

- Erosion and sediment controls must be inspected at least once a week and within 24 hours of the end of a storm that is 0.5 inches of rainfall or greater.

Additional Comments

It must be noted that the existing gravel operation adjacent to the proposed site is not currently in compliance with the industrial general permit. A site-specific Stormwater Pollution Prevention Plan must be prepared and a registration submitted to the DEP.

EASTERN CONNECTICUT CONSERVATION DISTRICT REVIEW

As a conservation organization, it is disappointing to contemplate the demise of a large wooded area adjacent to wetlands and the Quinebaug River, and therefore the Conservation District is not in favor of this proposal. However, it is the District's understanding that there are no regulations specifically prohibiting the removal of sand and gravel from this property. This being the case, comments below will apply to concerns that need to be addressed before the application is acted upon.

Aquifer Protection

With the removal of so much soil, water entering the aquifer is a considerable concern. Concerns arise from the direct connection between the aquifer and the functions of the soil and vegetation. First, consider that the excavation will be removing all vegetation, which takes up and transpires enormous amounts of water. Second, consider the vast amount of soil being removed, and that it currently retains an enormous amount of water. Third, consider that the existing soil currently acts as a filter for water entering the aquifer.

The aquifer is not this Team member's area of expertise, therefore it is strongly recommended that someone with the appropriate expertise provide Canterbury with the information they need to determine whether or not the impact on the aquifer is acceptable. Also, the Town of Canterbury should be aware of the new Connecticut Aquifer Protection Regulations, and insure that this project is in compliance.

Wetland Protection

a) In light of the drastic alteration of the watersheds of the wetlands, we recommend that the buffers around the wetlands be increased to at least 100 feet. Increasing to 200 feet would be a major improvement in this proposal.
b) There is a small wetland located within Phase 3 that is slated to be preserved. It is this reviewer's opinion that this wetland will not be a worthwhile functioning wetland. It is recommended that instead of saving this small wetland, there be an increase in the width of the buffers around the other remaining wetlands (over and above the 100 foot minimum recommended above).

Erosion and Sediment Control

This proposal is not in compliance with Connecticut's Guidelines for E&S Control. It is strongly recommended that Canterbury require the

proposal to be in compliance with the State's Guidelines. The E&S notes on the current plans are inadequate.

Visual Screening for Aesthetics

Many jurisdictions consider gravel excavations to be eyesores, and require a buffer of forest and/or vegetated mounds of earth to visually screen the excavations from public roads. Canterbury may wish to consider instituting such a requirement.

Restoration

Restoration of this property is a great concern. The question for Canterbury is: What do they want their town to look like in the future? Many jurisdictions have considered this question and mandated that gravel excavations be restored to contours that attempt to mimic the natural terrain. The current proposal leaves extremely steep slopes, which are obviously manmade. We recommend that the final slopes vary in steepness, with none being steeper than 4:1. Final slopes should be contoured to appear as natural as possible. Also related to restoration is the need to amend the soil before re-vegetation. It was noted during the field walk that the exposed soil in the current excavation is very poor. Therefore, it is recommended that restoration specifications require 6 inches to 1 foot of lightly compacted topsoil be incorporated into all exposed ground before re-vegetation.

Bonding

It is recommended that Canterbury require the applicant to post a bond large enough to enable the Town to complete any required work. The bond would be utilized in the event that the applicant does not acceptably fulfill all requirements.

WETLAND CONCERNS

The proposal has prompted two areas of wetland concern, each of which is equally important. These are: 1) the wetlands on the site and, 2) the wetland system abutting the site.

The two wetlands located on the site have been well described elsewhere in the report for the Kobyluck Brothers, LLC prepared by CLA Engineers, dated September, 2003. The two wetlands consist of the larger wetland system to the northwest of the property and the smaller isolated wetland which occurs in a topographical depression to the east.

The larger system is a diversely vegetated wetland interconnected hydrologically and constrained by a small outlet under the railroad. The smaller wetland was reviewed for potential capacity to be used as a breeding pool but the evidence seems to show it is not. Penelope Sharp, in her 1998 report, totals the on-site wetlands at 5.7+ acres.

Neighboring Wetland

The second issue is the potential impact to the hydrologic groundwater connection between the quarry and the neighboring white cedar swamp. Cedar swamps are a rare and diverse environment in Connecticut and the issues with them are manifold.

First, the existence of this resource needs to be put into perspective. White cedar swamps are not common in Connecticut. Those that exist have often been impacted by neighboring land use or altered drainage. Typified by diverse species and its floating sphagnum moss mat, the complex is home to sheep laurel, cotton grass, black spruce, creeping snowberry and pitcher plants. In addition, Mr. Keith Underwood states in his December 16, 2003 letter to Mr. Tetrault, the ponded area is " . . . surrounded by a prolific growth of young Atlantic White Cedar forming an extraordinary mound and hummock wetland that then grades down into a mature Atlantic White Cedar forest." Additional individual and small stands of large Atlantic White Cedar border that forest.

Mr. Kenneth Metzler of the Connecticut Geological and Natural History Survey states that he has been monitoring a database of Atlantic White Cedar swamps and bogs for the past twenty years. He finds this wetlands complex ranking among the best. Indeed, in all of Connecticut only thirty of these wetlands are closely monitored and very few equal the excellence of diversity and ecological strength this community shows.

Mr. Metzler further states that he visited the area twice during the month of June, 2004 for about two hours in total. He concentrated on the adjoining Atlantic white cedar swamp and the associated bog. He found the combination of bog and cedar swamp is fairly representative of those found in southeastern Connecticut with a fair mix of hardwood species such as red maple and ash. In some places the cedar is in relatively "pure" stands with little understory of shrubs or herbs. The

ground is hummocky with areas of standing water during wet periods, otherwise covered by numerous bryophytes.

A population of creeping snowberry *(Gaultheria hispidula,* State Threatened) was found during the second visit. Its extent and distribution is unknown and needs additional survey work.

The bog portion of this wetland complex is typical, dominated by leather leaf and huckleberry with some wet mats and an open pool. Numerous dragonflies (6+ species) and moths were observed throughout. A female Hessel's hairstreak *(Mitoura hesseli,* State Endangered) was captured by luck during the second visit. These butterflies are cedar feeders generally spending most of their time in the canopy.

Thus, it is well recognized by the ecological community that this is a special area infrequently found in the state. The concern for it then is one of maintaining its integrity including its dynamic flora and fauna and the hydrology that enables it to exist.

Comments/Recommendations

No Impact - The proposed gravel operations must not impact this wetland complex in any way. As with any use of abutting land, the neighbors have the right to expect no impact to their property. In this case where there is no threat of obvious above-ground impact, the concern is the potential for impacting or altering the ground water level;

a change that could potentially decimate the Atlantic White Cedar wetland complex.

What to do - A hydrologic study which compares water levels in standpipes from the Atlantic Cedar Swamp site to the excavation site can easily determine the water table relationship between the two areas. The water level of the groundwater must be documented before any work begins and maintained throughout the length of the project.

It is the understanding of the relationship of the groundwater between the two sites that is the goal and can be established by the series of deep and shallow observation wells. Once established, the ground water level under the area of gravel operation should related to that of the swamp bog. The levels in all wells should be monitored over a period of several years. These observations should be used to determine the lower limit of excavation that will not have an impact on the groundwater of either system.

Mr. Metzler states in his letter to Mr. Shinkiewitz dated December 30, 2003 that: "without careful considerations of excavation depth, separating distances, slope stabilization, and restoration of the excavated site, the long term impacts could be disastrous."

The monitoring technique described above has been successfully implemented to monitor similar operations. It met with success (i.e.: maintained the integrity of the target wetland) and shows that when done well and monitored, the excavation can be completed and the

integrity of the wetland resource maintained. Mr. Metzler can be reached at the Department of Environmental Protection at (860) 424-3585 to offer further input as needed.

Gravel extraction, though it may take years, is a temporary land use. If done well, the restoration of the site offers the opportunity to replace the quarry with beneficial wildlife environments. Ms. Sharp and the text of CLA Engineer's report have described the site renovation as, ". . . loaming and seeding . . ." once extraction is complete and, "... four inches of topsoil and planting of evergreen trees next to the trees remaining around the wetland" respectively. But the Team has not received and was not able to review a final reclamation plan for the site.

Details of the site renovation are often up to the town regulations. Typically, the renovation includes backfilling the site with topsoil to a specified depth, which provides a foundation for a variety of plant life, stabilizing steep walls and/or decreasing the slope of the walls of the completed operation, and final grading which can direct surface water as needed. Restoration of each phase can be completed before the next phase of extraction begins.

Because of the nature of the soils on the site, it is mandatory that the latest Erosion and Sediment controls be employed, the 50 foot setback be honored and none of the wetlands be used for sediment basins. The *2002 CT Guidelines for Soil Erosion and Sediment Control* can be obtained at the DEP Store (860) 424-3555 or on-line at:

http://www.whereeveryhingis.com/depstore/ under the Municipal Commissioners section.

Finally, it is recommended that a flora and fauna inventory be conducted on the neighboring area since study of it has been extremely limited. This should be a priority from a State and regional perspective, preferably before work begins.

THE NATURAL DIVERSITY DATA BASE

The Natural Diversity Data Base maps and files regarding the project area have been reviewed. According to our information their are known extant populations of State Endangered *Scaphiopus holbrookii* (spadefoot toad) and State Threatened *Ambystoma laterale* (blue spotted salamander, diploid population) that occur in the vicinity of this project site.

Blue-spotted salamanders are associated with riparian red maple swamps. They also occur in disjunct vernal wetlands near red maple swamps. They breed in March and April and may be found on the surface on wet rainy nights. They favor grassy or wooded, flood plain wetlands for breeding. If the favored habitats occur on this property and are going to be impacted than the blue-spotted salamander may be affected.

Limited information is known about Eastern Spadefoot Toad. They are very secretive and have irregular breeding periods. They are most active from June through August. They are expert burrowers going as deep as 2 meters in sandy well-drained soil. They are very rarely observed outside of the breeding period. Their habitat is described as arid to semi-arid areas, such as fields, farmland, dunes and woodlands with sandy or loose soils. And they breed in

temporary bodies of water, flooded fields and forested wetlands. (For more information please see the following fact sheet with life history information.)

If this work will be conducted in any Blue-spotted salamander or Eastern spadefoot toad habitat, the Wildlife Division recommends that a herpetologist familiar with the habitat requirements of these amphibians conduct surveys. A report summarizing the results of such surveys should include habitat descriptions, amphibian species list and a statement/resume giving the herpetologist' qualifications. The DEP doesn't maintain a list of qualified herpetologists. A DEP Wildlife Division permit may be required by the herpetologist to conduct survey work, you should ask if your herpetologist has one. The results of this investigation can be forwarded to the Wildlife Division and, after evaluation, recommendations for additional surveys, if any, will be made.

Please be advised that the Wildlife Division has not made a field inspection of the project nor have we seen detailed timetables for work to be done. Consultation with the Wildlife Division should not be substituted for site-specific surveys that may be required for environmental assessments. The time of year when this work will take place will affect this species if they are present on the site when the work is scheduled. Please be advised that should state permits be required or should state involvement occur in some other fashion, specific restrictions or conditions relating to the species discussed

above may apply. In this situation, additional evaluation of the proposal by the DEP Wildlife Division should be requested.

Natural Diversity Data Base information includes all information regarding critical biological 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 he substitutes for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identity 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.

WILDLIFE IN CONNECTICUT

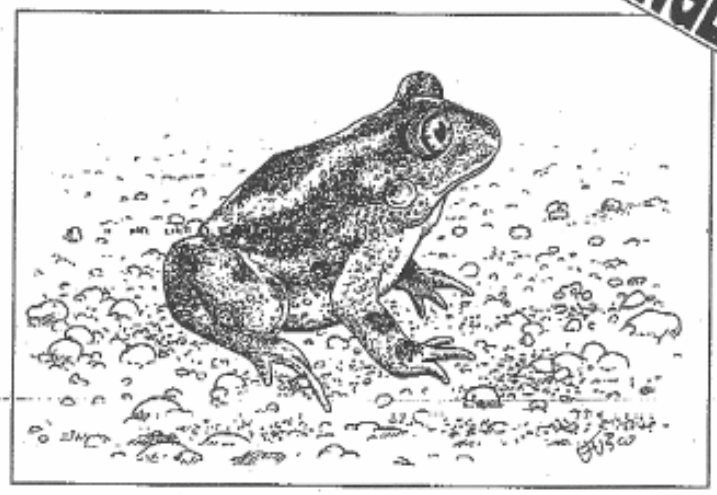
ENDANGERED AND THREATENED SPECIES SERIES

EASTERN SPADEFOOT TOAD

No. 28

ENDANGERED

Scaphiopus holbrookii



Habitat: Found in arid to semi-arid areas, such as fields, farmland, dunes and woodlands with sandy or loose soils. Breed in temporary bodies of water (e.g., vernal pools), flooded fields and forested wetlands.

Weight: Unknown.

Length: 1.75-3.25 inches.

Life Expectancy: At least 5 years of age.

Food: Flies, crickets, caterpillars, moths, spiders, centipedes, millipedes, earthworms and snails. Tadpoles initially feed on plankton (microscopic plants) for a few days. The tadpoles then become carnivorous and sometimes even cannibalistic.

Status: State endangered.

Identification: Eastern spadefoot toads are plump, with smooth skin and scattered, tiny warts. They range in color from olive to brown to black. Two irregular yellow stripes on the back may form a vase-shaped pattern or resemble the outline of a misshapen hourglass. Unlike most frogs and toads in North America, which have round or horizontal pupils, spadefoot toads have almost vertical pupils. They can be distinguished from other toads by a black, sharp-edged, spade-like projection on the underside of each foot.

Range: The eastern spadefoot toad occurs from southern New England to south Florida, west to southeastern Missouri, northeastern Arkansas and eastern Louisiana.

Reproduction: Spadefoot toads are "explosive breeders," appearing suddenly, sometimes in great numbers, after heavy rains that occur during the warm months of the year. This is usually a one-night phenomenon, although the toads can breed several times at the same site from April to July. There is no regular, annual migration to the breeding pools. Instead, the event is triggered by a quick drop in barometric pressure, more than 2 inches of rainfall and darkness.

Spadefoot eggs are laid underwater and deposited in strings, which are easily broken. Eggs are typically attached to a twig, grass blade, fern leaf or some other type of vegetation. The male fertilizes the small, dark eggs as the female lays them. A female may lay up to

2,500 eggs, which hatch in 1 to 7 days. The tadpoles grow quickly, transforming into toads in 16 to 20 days for late-season broods and 48 to 63 days for early-season broods.

History in Connecticut: Eastern spadefoot toads are considered rare in Connecticut. Only 16 sightings of spadefoots were reported from 1811 to 1936 in southern New England. The species was only seen 8 times at various locations throughout the state from 1970 to 1989.

Reason for Decline: The population of spadefoot toads in Connecticut is threatened by the loss of habitat due to development and urbanization. The toads are also susceptible to high mortality when breeding pools dry up before the tadpoles can grow into toads (metamorphose).

Interesting Facts: The eastern spadefoot toad is probably the rarest and most secretive amphibian found in Connecticut. It has been the subject of myths claiming that it remains buried for years underground in shallow burrows before surfacing to breed. Spadefoots do remain underground in shallow burrows for weeks during dry periods. Being nocturnal and usually subterranean (underground), this creature is very difficult to find. On damp summer nights, spadefoots often emerge from their burrows. When rainfall is extensive, their call, a short explosive "wank," like the call of a crow, may be heard.

The spade-like projections on the hind feet of the spadefoot enable it to dig easily into the soil. By rocking back and forth and rapidly digging with its hind legs, the toad can vanish quickly below the surface of loose soil.

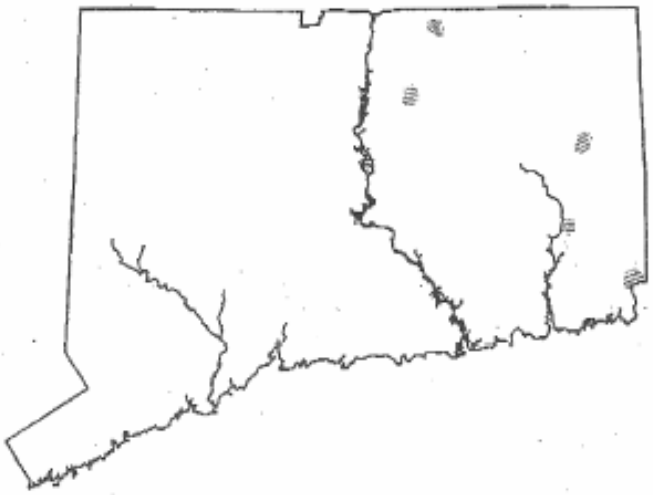
During periods of extended drought, eastern spadefoot toads can lie dormant. They curl into a tight ball and excrete a fluid that hardens the soil around them, forming a compact chamber to retain any available moisture. When heavy rains soak the soil, the toads unCurl and resume their normal activities.

When handling spadefoot toads, many people experience strong allergic reactions to secretions from the toads' skin glands. Reactions may include violent sneezing, a runny nose and watery eyes. To prevent an allergic reaction, anyone who handles a spadefoot toad should wash their hands thoroughly with soap and water, keeping their hands away from their face and eyes until they do so.

Protective Legislation: *State* - Connecticut General Statutes Sec. 26-311.

What You Can Do: The protection of vernal pools (pools of water that are present during the spring, but may dry up during the summer) and other temporary water bodies will help many of Connecticut's amphibian species. Pools located near sandy soils or dry, open areas are of particular importance to spadefoot toads. Learn to identify these special habitats so they can be noted and protected.

CONNECTICUT RANGE



WILDLIFE RESOURCES

The ERT site inspection was conducted on May 18, 2004 to evaluate existing wildlife habitat on the property. The property is approximately 26 acres, with proposed excavation of approximately 12 acres in the upland forest area. The property is mostly forested uplands, with approximately 5.7 acres of wetlands along the western edge. All proposed excavation is to occur in the forested uplands.

Existing Wildlife Habitats

Upland Forested Area

This area is comprised of approximately 20 acres of mixed-age, mostly deciduous forest, dominated by black oak, red oak and red maple. The understory is comprised primarily of witch hazel and mountain laurel and white pine saplings, with little vegetation in the ground cover layer. Forested areas are valuable to wildlife, providing cover, food, nesting and roosting places and denning sites. Mast produced by oaks provides excellent forage for a wide variety of mammals and birds including white-tailed deer, gray squirrel, southern flying squirrel, eastern chipmunk, white-footed mouse, eastern wild turkey and blue jay. Trees, both living and dead, also serve as a home for a variety of insects, which, in turn, are eaten by many species of birds, including woodpeckers, warblers and nuthatches. Other wildlife found in this habitat type include scarlet tanager, ovenbird, white-breasted nuthatch,

American redstart, barred owl, broad-winged hawk, redback salamander and northern ringneck snake.

Wetlands

The area surrounding the excavation site contains approximately 5.7 acres of interconnected wetlands, comprised primarily of red maple swamp, toward the northern and western edges. These types of areas produce an abundance of insects, providing food for reptiles, amphibians, birds and bats. Many species of reptiles and amphibians, such as the gray tree frog and the spotted salamander, use wetlands for breeding and spend the balance of their time in the adjacent forested uplands. Many species of birds use forested wetlands at varying times of the year for breeding, feeding and shelter. Examples include wood thrush, northern water thrush, common yellowthroat and eastern phoebe. Other wildlife likely utilizing this habitat for food and cover are raccoons, star-nosed moles, wood frogs, pickerel frogs, spring peepers and eastern garter snakes.

Impacts

Although no excavation or filling will be done in the wetlands, excavation in the forested uplands will impact not only upland species, but also many wetland-dependent species. As noted in the wetlands assessment prepared by CLA Engineers for Kobyluck Brothers LLC, "the primary potential for impact due to this project is for loss of upland habitat surrounding the two wetlands." They also note that documented vernal pool species and the state protected species that may use the site

require extensive areas of upland habitat, and the proposed excavation would eliminate much of the area that is currently available. Calhoun and Klemens (2002) recommend that the upland areas around breeding pools up to a distance of 750 feet be considered critical upland habitat, that at least 75% of that zone be kept undisturbed and that a partially closed-canopy stand be maintained. Based on the best, most current science, the currently proposed 50' buffer would not be sufficient to prevent impact to wetland-dependent species.

State Listed Species

According to the State of Connecticut Department of Environmental Protection Environmental Geographic Information Center's Natural Diversity Database, two species on Connecticut's list of threatened, endangered and species of conservation concern occur in the vicinity of the proposed project site; the blue-spotted salamander (state threatened) and the eastern spadefoot toad (state endangered). Blue-spotted salamanders are associated with riparian red maple swamps. They also occur in disjunct vernal wetlands near red maple swamps and prefer grassy or wooded floodplain wetlands for breeding. These habitat types occur on the subject site.

Little information is known about the eastern spadefoot toad, however, they do breed in temporary water bodies and forested wetlands. Per a letter dated January 21, 2003, from Michael Klemens (a state and nationally recognized expert herpetologist) to the town of Canterbury Wetlands Commission, a sub-adult eastern spadefoot toad was observed

on Butts Bridge Road on July 24, 2002, very close to the project site. He states that "the fact that this specimen is a sub-adult indicates that these toads are breeding nearby, likely within 750 feet of where the toad was located." Mr. Klemens also notes that glacial terraces interspersed with wetlands constitute ideal habitat for this species. Because of the existing habitat types and the proximity to a confirmed observation, potential spadefoot toad habitat may be found on the subject site. Preserving all critical habitat (including upland forest) associated with the vernal pools and wetlands is important for the conservation of these state listed species.

Adjacent Atlantic White Cedar Swamp

There is an extensive Atlantic white cedar swamp southeast of the proposed excavation site. According to the 1998 Draft "Thirteen of Connecticut's Most Imperiled Ecosystems" by Kenneth Metzler and David Wagner, Atlantic white cedar swamps are considered one of Connecticut's 13 most imperiled natural communities and support a number of rare plants and animals. In correspondence dated December 30, 2003 with Mr. Roger Shinkiewitz, Ken Metzler notes that "particular attention should be paid to groundwater connectivity between the wetland and the excavated area to ensure that there will be no subsurface draining of the bog." If the excavation project proceeds, all efforts should be made to ensure that this area is not adversely affected.

Reducing Impacts

As the amount of development or habitat conversion to highly disturbed construction area increases, the value for wildlife proportionally decreases. How intensely and for how long the gravel site is worked are factors that can augment the impacts of the operation. Minimally, based on the quality of the wetlands both on- and off-site, and the known populations of state listed species in adjoining areas, adequate buffer zones should be instituted. According to the best science available, a buffer of at least 750 feet from the wetlands into the uplands is needed to somewhat reduce the impacts to reptile and amphibian species using the upland forest area in conjunction with the wetland.

Summary

The proposed project will, for the foreseeable future, almost totally replace the existing upland forest habitat with a working gravel pit. The high level of disturbance found at a working gravel operation, coupled with the conversion of habitat, will allow for only limited wildlife use of the area. While no excavation or conversion is planned for the wetlands, the greatest potential impact will be to the reptile and amphibian species that use the wetlands in conjunction with the adjacent uplands. Most reptile and amphibian species are not very mobile and cannot easily seek out suitable habitat elsewhere once disturbance has occurred. In addition, it is possible that at least two state listed species,

which have been found in adjoining areas and are known to use habitat similar to that found on the site, could also be negatively impacted. The Atlantic white cedar swamp, found on a neighboring property and considered a rare natural community in Connecticut, could also potentially be negatively impacted if groundwater hydrology is disturbed due to gravel excavation.

References

Calhoun, A. J. K. and M.W. Klemens. 2002. Best Development Practices: Conserving Pool Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States. MCA Technical Paper No. 5, WCS, Bronx NY, 57 pp.

VEGETATION

The vegetation present on the site of the proposed gravel excavation falls into two broad cover type categories, Mixed Hardwoods and Wetlands. Thc approximatc locations of these vegetation cover types have been delineated on the Forest Vegetation Map.

The Mixed Hardwood type (Type A) which totals approximately 20.4 acres is the dominant vegetation cover. It is made up primarily of sawtimber sized trees (11.1" and larger in diameter at breast height (d.b.h.)(measured four and one-half feet above the ground)) and some pole sized trees (6.1" to 11" d.b.h.). Tree stocking levels range from fully stocked to overstocked with trees estimated to be between 60 to 100 years old. Black oak, scarlet oak, white oak, black birch and red maple form the overstory throughout the type. Sugar maple and white ash are scattered within the type especially near the wetlands. Pockets of eastern white pine also occur within this type. An understory of sapling (1.1 " to 6" d.b.h.) and pole sized black birch, black oak, white oak, red maple, sugar maple, eastern white pine, hophornbeam, and flowering dogwood is present. A light to moderate shrub layer of huckleberry, lowbush blueberry, highbush blueberry, viburnums, and mountain laurel is found in the type. Ground cover vegetation includes several species of ferns and grasses together with poison ivy and club mosses.

Included with in this type is a small vernal pool surrounded by an overstory of red maple and sugar maple, an understory of red maple and American elm, and a open shrub layer of spicebush.

The Wetlands type (Type B) occupies about 5.2 acres of the subject property. Pole and sawtimber-sized red maple and eastern white pine form the overstory. It is fully stocked with trees estimated to be between 60 and 80 years of age. The understory is comprised of sapling to pole-sized red maple, eastern white pine, white ash, and American elm. A light to moderate shrub layer of highbush blueberry, swamp azalea, spicebush and sweet pepperbush exists. The ground cover vegetation consists of a variety of ferns, sedges, flag, and skunk cabbage.

Mitigating Development Impact

The proposed utilization of the property for gravel extraction will impact the vegetative negatively, dependent upon the extent of clearing necessary. The extent of vegetation losses will depend upon the magnitude of site development. Removal of all woody vegetation from the excavation areas and access roads will be necessary.

The trees which are removed during the clearing operations should be utilized for sawtimber, fuelwood and woodchips. Areas to be cleared should be well defined and clearly marked so as to prevent unnecessary and unwanted clearing. The wetland buffers should be marked as equipment exclusion zones to prevent unwanted traffic by timber

harvesting equipment. This marking will minimize the chances of trees to be retained within the buffer being damaged by mechanical injury and/or soil compaction.

Soil compaction will adversely affect soil moisture and aeration balance. This imbalance could lead to a decline in tree health and vigor and can potentially lead to tree mortality within three to five years. Physical damage to the root system or bark damage (mechanical injury) will allow the introduction of decay organisms, which may also result in the decline of a tree's health over time. Trees in decline or dead may have to be removed if they present a hazard.

Long Term Management

The excavated area should receive a final grading, and be revegetated and restored as soon as possible after work in each area is completed. While grasses stabilize the soil, long term benefits are gained when trees and shrubs are planted. Not only is the soil stabilized, but also food and cover are provided for wildlife, and visual and noise buffers are created and/or reinforced.

A public service forester or a private certified forester can provide on-site planting advice, tree species selection, spacing, etc. upon completion of an area if needed.

Landscape Impacts

The effect of the proposed gravel extraction on the nearby Atlantic white-cedar swamp and bog can not determined without a hydrologic study comparing water levels at the two sites.

Atlantic white-cedar grows in a narrow coastal belt (50 to 130 miles wide) from southern Maine to northern Florida and west to southern Mississippi. Scarcity of suitable sites makes distribution of the species within this coastal belt extremely patchy (Little and Garrett, 1990). White-cedar has a shallow root system. Changing the water level either by flooding or draining may cause irreversible damage and possible loss of this ecosystem.

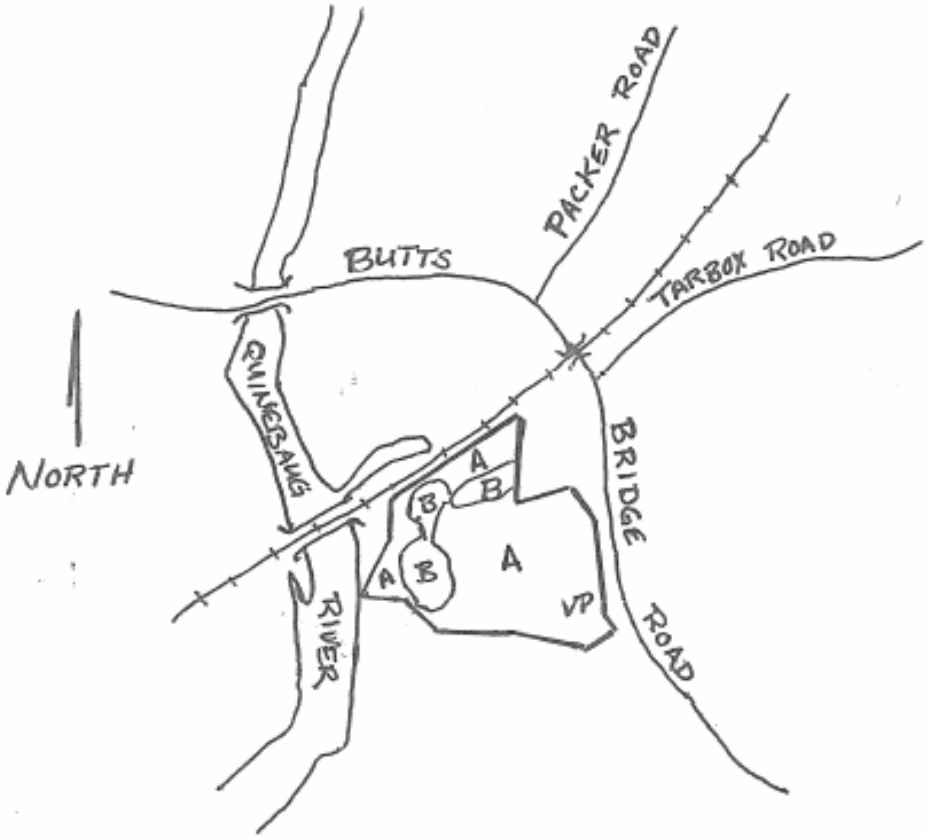
Literature Cited

Little, Silas and peter W. Garrett, 1990, Chamaecyparis thyoides (L.) B.S.P. Atlantic White-Cedar. In Silvics of North America, Volume 1, Conifers, p. 103-108. Russell M. and Barbara H. Honkala, Technical Coordinators. U.S. Department of Agriculture, Agriculture Handbook 654. Washington, DC.

VEGETATION TYPE MAP
Kobyluck Brothers Proposed Gravel Excavation
Canterbury, Connecticut

May 18, 2004

SCALE: 1" = 1000'



VEGETATION TYPES

A	MIXED HARDWOODS	20.4+/- ACRES
B	WETLANDS	5.2+/- ACRES

LEGEND

PROPERTY BOUNDARY

VEGETATION TYPE BOUNDARY

VERNAL POOL VP

ARCHAEOLOGICAL AND HISTORICAL REVIEW

A review of the State of Connecticut Archaeological Site files and maps shows no known archaeological site listed for the project area. However, the files do indicate four historic sites located to the immediate proximity to the project area. One of these listed sites is the unmarked Walton Family Burying Ground.

The Walton Family Burying Ground was an unmarked colonial cemetery dating to the 1750s. In 1990, sand and gravel mining uncovered the graveyard literally when skulls began to roll down the gravel embankment. This project area has topographic, soil and environmental featured similar to the location of this family cemetery. The Office of State Archaeology (OSA) and the State Historic Preservation Office (SHPO) strongly recommend review for unmarked colonial and historic burying grounds.

The Office of State Archaeology and the State Historic Preservation Office both note that the project area possess moderate to high sensitivity for prehistoric and historic archaeological resources. Therefore, they strongly encourage the Canterbury Inland Wetlands and Watercourses Commission to recommend and require that a professional reconnaissance survey be undertaken to identify and evaluate all archaeological resources which may exist within the

proposed project limits, including equipment storage and associated work areas. The survey should be conducted in accordance with the Connecticut Historical Commission's *Environmental Review Primer for Connecticut's Archaeological Resources.*

No ground disturbance or construction-related activities should be initiated until the OSA and SHPO respective offices have had an opportunity to review the recommended archaeological survey report and to subsequently provide further substantive guidance to the Canterbury Inland Wetlands and Watercourses Commission.

ABOUT THE TEAM

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a varety of federal, state and regional agencies. Specialists on the Team include geologists, biologists, foresters, soil specialists, engineers and planners. The ERT operates with state funding under the supervision of the Eastern Connecticut Resource Conservation and Development (RC&D) Area — an 86 town region.

The services of the Team are available as a public service at no cost to Connecticut towns.

PURPOSE OF THE TEAM

The Environmental Review Team is available to help towns and developers in the review of sites proposed for major land use activities. To date, the ERT has been involved in reviewing a wide range of projects including subdivisions, landfills, commercial and industrial developments, sand and gravel excavations, elderly housing, recreation/open space projects, watershed studies and resource inventories.

Reviews are conducted in the interest of providing information and analysis that will assist towns and developers in environmentally sound decision-making. This is done through identifying the natural resource base of the project site and highlighting opportunities and limitations for the proposed land use.

REQUESTING A REVIEW

Environmental reviews may be requested by the chief elected official of a municipality or the chairman of town commissions such as planning and zoning, conservation, inland wetlands, parks and recreation or economic development. Requests should be directed to the chairman of your local Soil and Water Conservation District and the ERT Coordinator. A request form should be completely filled out and should include the required materials. When this request is approved by the local Soil and Water Conservation District and the Eastern Connecticut RC&D Executive Council, the Team will undertake the review on a priority basis.

For additional information and request forms regarding the Environmental Review Team please contact the ERT Coordinator: 860-345-3977, Eastern Connecticut RC&D Area, P.O. Box 70, Haddam, Connecticut 06438.