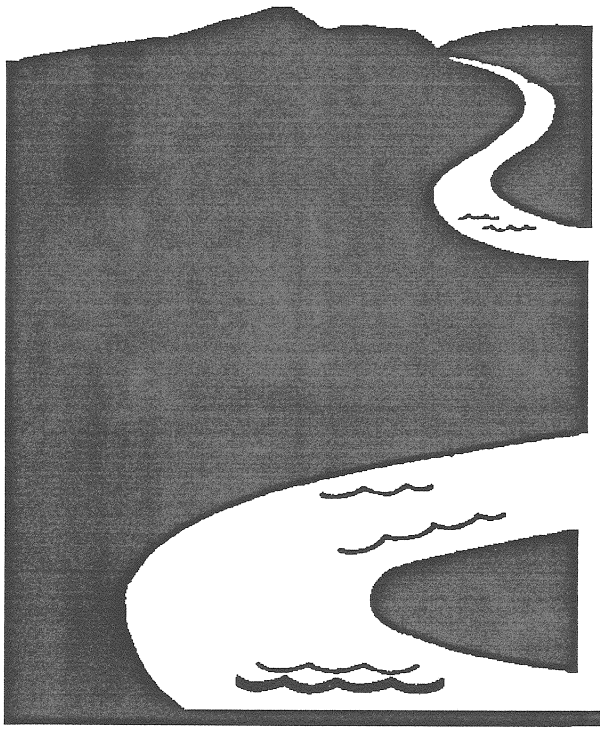

Salem Earth Products Inc. Excavation

Lyme, Connecticut
June 1991

EASTERN CONNECTICUT ENVIRONMENTAL REVIEW TEAM REPORT

Eastern Connecticut Resource Conservation and Development Area, Inc.

Eastern Connecticut Environmental Review Team on
Salem Earth Products Inc. Excavation
Lyme, Connecticut

This report is an outgrowth of a request from the Lyme Conservation Commission and Inland Wetlands Agency to the New London Soil and Water Conservation District (SWCD). The SWCD 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 ERT met and field checked the site on Tuesday, April 23, 1991. Prior to the review day each Team member received a summary of the proposed project, a list of the town's concerns, a location map, topographic map and a soils map. During the field review the Team members were given plans and additional information. The Team met with and were accompanied by the Lyme Inland Wetlands Agent and Zoning Enforcement Officer, the applicant and his engineers and attorney, and the Pleasant Valley Association (neighborhood group) and their consultant. Following the review, reports from each Team member were submitted to the ERT Coordinator for compilation and editing into this final report.

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

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

If you require further additional information, please contact:

Elaine Sych, ERT Coordinator
Eastern Connecticut Environmental Review Team
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Telephone: (203) 345-3977

Salem Earth Products Inc. Excavation
Lyme, Connecticut

Review Date: April 23, 1991

Report Date: June 7, 1991

Environmental Review Team
Report #491

Eastern Connecticut Resource
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Telephone: (203) 487-4042
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Introduction

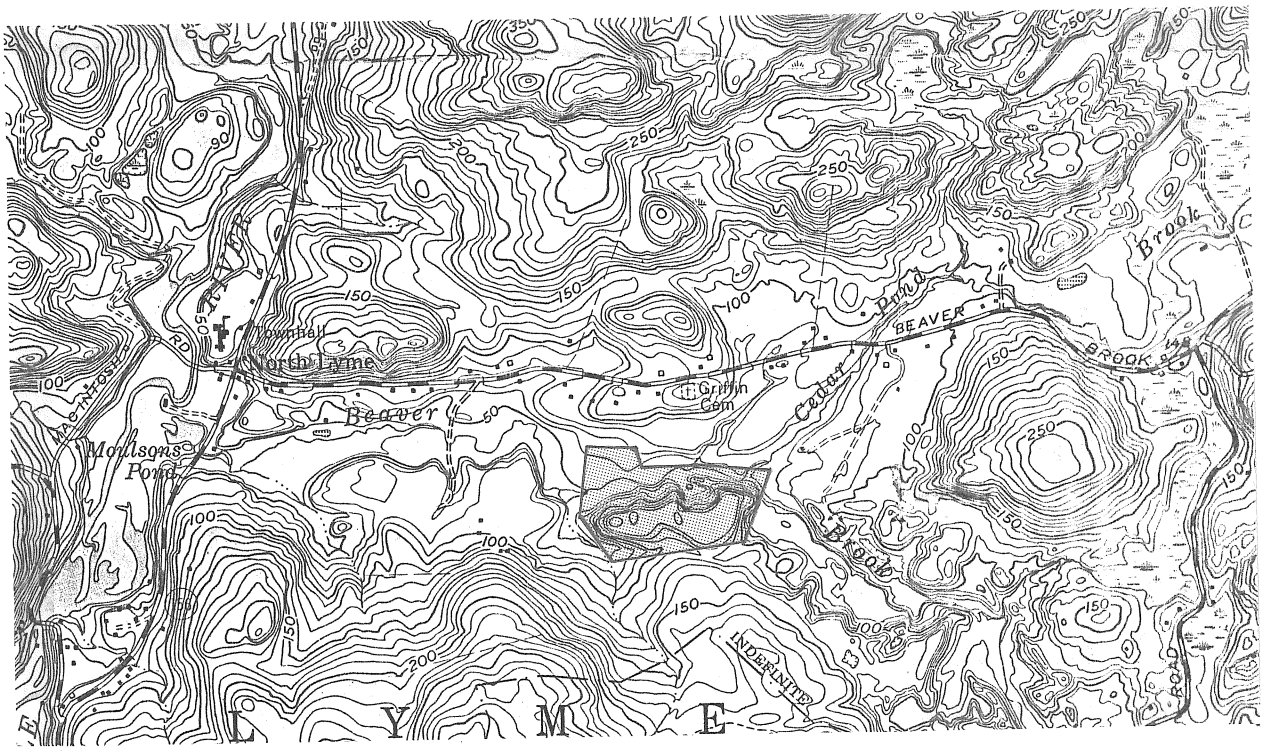
Elaine A. Sych, ERT Coordinator
Eastern Connecticut Resource Conservation and Development Area, Inc.
Telephone: 345-3977

The Lyme Conservation and Inland Wetlands Agency has asked for assistance in reviewing a sand and gravel excavation project proposed by Salem Earth Products, Inc. The site is accessed from Beaver Brook Road, and is made up to two parcels (Lyme Tax Assessor's Maps #26, Lot 8 and #27, Lot 26). Approximately ±1,000,000 cubic yards of material could be removed in a period of ten years or more depending upon the market conditions.

The Environmental Review Team members were asked to review the plans with a special emphasis on impacts to wetlands and watercourses, as well as traffic and visual/noise problems and site restoration. The following sections contain basic natural resource information, highlight areas of concern and offer recommendations to mitigate potential negative impacts. Suggestions are also given to additional questions and information that the Commission should ask for and receive prior to making a decision on this project. ■

Location Map

Scale 1" = 2000'



Topography and Geology

Dr. Norman Gray, Professor and Department Head
Geology and Geophysics - University of Connecticut
Telephone: 486-4434

Setting

The proposed site is a 27 acre flat-top mound of ice-contact stratified drift (sand and gravels) rising 70 feet above the floodplain of Beaver Brook, one mile east of North Lyme, CT. The ridge is bounded on its northern and eastern flanks by Beaver brook. An unnamed small intermittent stream valley on its south side separates the upper 40 feet of deposit from the till covered southern slope of the Beaver Brook Valley. The area drained by the brook and its tributaries upstream from the site covers approximately 4700 acres.

Two small kettles, one at the top of the ridge at its eastern end, and the other at the base on its northeastern side are noteworthy topographic features of the site. Kettles are steep sided bowl-shaped depressions formed by the melting of large detached blocks of stagnant ice that had been wholly or partly buried in glacial outwash.

Bedrock Geology

Although bedrock is not exposed within the bounds of the proposed site the geology of the area was mapped by Lundgren (1966, CT Geological Survey QR-19, terminology revised by Rodgers 1985, CT State Geological Map). From that study it would appear that the site lies along the axis of the Selden Neck Dome, a major structural feature of Southeastern Connecticut's geology, and is directly underlain by granitic gneisses of the Potter Hill group. Grey colored quartz-feldspar-biotite gneisses of the Mamacoke Formation are mapped north and south of the site. The gravel of the ridge consists mainly of pebbles and boulders of these gneisses. The Mamacoke Formation is reported to include some calc-silicate and amphibolite gneisses which commonly contain small amounts of sulfides. Sulfides may weather and contribute iron and acid to surface waters. However, no rusty weathering material material was observed in the gravels exposed at the proposed excavation site.

Surficial Geology

The Salem Earth Products proposed site is part of a system of discontinuous but extensive sand and gravel terraces along the sides of Beaver Brook and its tributaries valleys. The deposits, which geologically are termed "kame" terraces, are composed of stratified well sorted sand and gravel deposited by glacial meltwaters flowing along the valley flanks at a time when ice still partially occupied the central portion of the valley. Kettles, small closed depressions marking sites where blocks of ice

were buried by rapidly deposited sand and gravel, are common and are convincing evidence of the ice contact nature of these deposits. The discontinuous outline and steep edges of the terrace deposits are another indication that ice bounded and provided support during their deposition. Two separate terrace systems are recognizable on the basis of their topographic expression. The earliest, defined by discontinuous hummocky deposits with graded tops at elevation between 134 and 140 feet, fills much of the Beaver Brook Valley southeast of the Salem Earth Products proposed site. A later system of smooth topped terraces at elevations between 95 and 110 feet are found to the west, along Beaver Brook, and to the northeast of the proposed site in the Cedar Pond Brook valley. Recent deposits of sand, silt and organic-rich muds cover the floodplain wetlands of Beaver Brook and its tributaries.

Sand and Gravel Potential

The stratified drift deposit is a flat-topped ridge 1900 feet long, 500 feet in width and 70 feet in height covering approximately 27 acres. Exploratory pits along the ridge crest expose coarse clean well sorted gravel composed of pebbles and small boulders of the various gneisses which make up the bedrock in the immediately surrounding area. The gravel is very porous and permeable and as a result the water table under the ridge is fairly deep (10's of feet). Indeed, a small 15 foot deep kettle (for some reason not shown on the detailed topographic survey supplied by Salem Earth Products) at the eastern end of the ridge shows no evidence of intersecting the local water table. Cuts along the southern gravel access road suggest the coarseness of the material decreases towards the bottom of the ridge. A small borrow pit at the base of the hill is dug into silt sized material. Although this may have been material which was washed down the steep slope, or was transported by wind before a protective vegetation cover was established after the ice disappeared, it may suggest that some portions of the ridge may not be worth excavating.

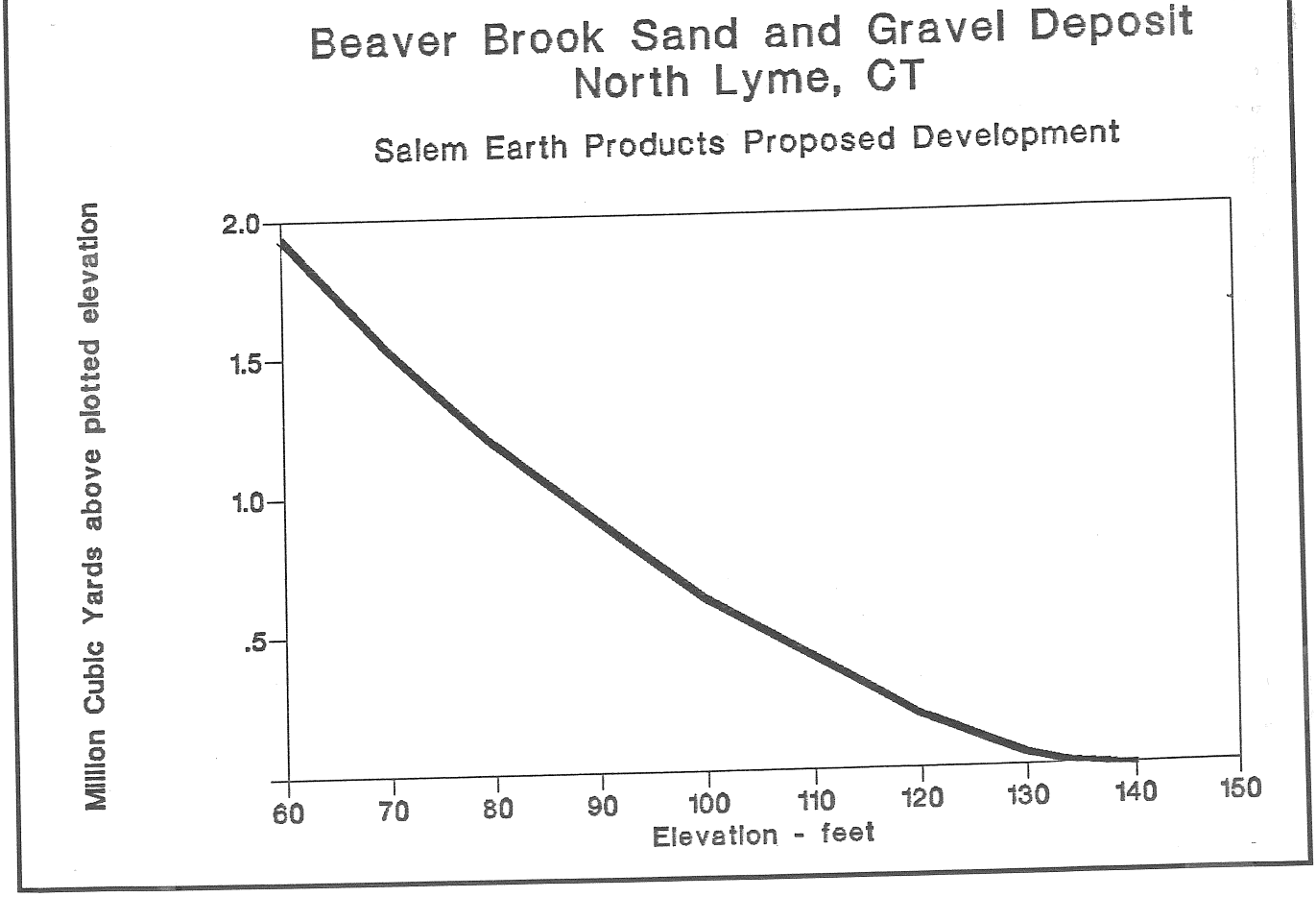
The kame ridge contains in excess of 1,900,000 cubic yards of material. As areas less than 10 feet above the elevation of the wetlands of Beaver Brook would have to be left undisturbed to provide sufficient drainage for future uses of the land only about 1,400,000 cubic yards are potentially available. Salem Earth Products apparently intends to develop the deposit from the top down in order to minimize the amount of sediment escaping into the surrounding wetlands. As the ridge is separated from the valley walls above the 110 foot contour, excavation down to that level should have a minimal long term impact on the hydrology of the wetlands. 400,000 cubic yards lie above the 100 foot elevation (see figure 1). The removal of the additional material between 110 and 70 feet elevation will involve minor alterations in the pattern of surface drainage and as a consequence may induce local changes in the hydrology of the adjacent wetlands. Silt carried by

runoff must be minimized. The plan proposed by Salem Earth Products addresses the silt problem by keeping exposed workings below the level of the surrounding undisturbed area at all stages of development. The approach is viable only as long as the bottom of excavation remains dry and above the local water table; a reasonable expectation provided the entire ridge is composed of coarse sands and gravel. *(Please refer to the Soils, Wetlands Review and Fish Resources sections for additional comments on erosion and sediment control).*

Recommendations

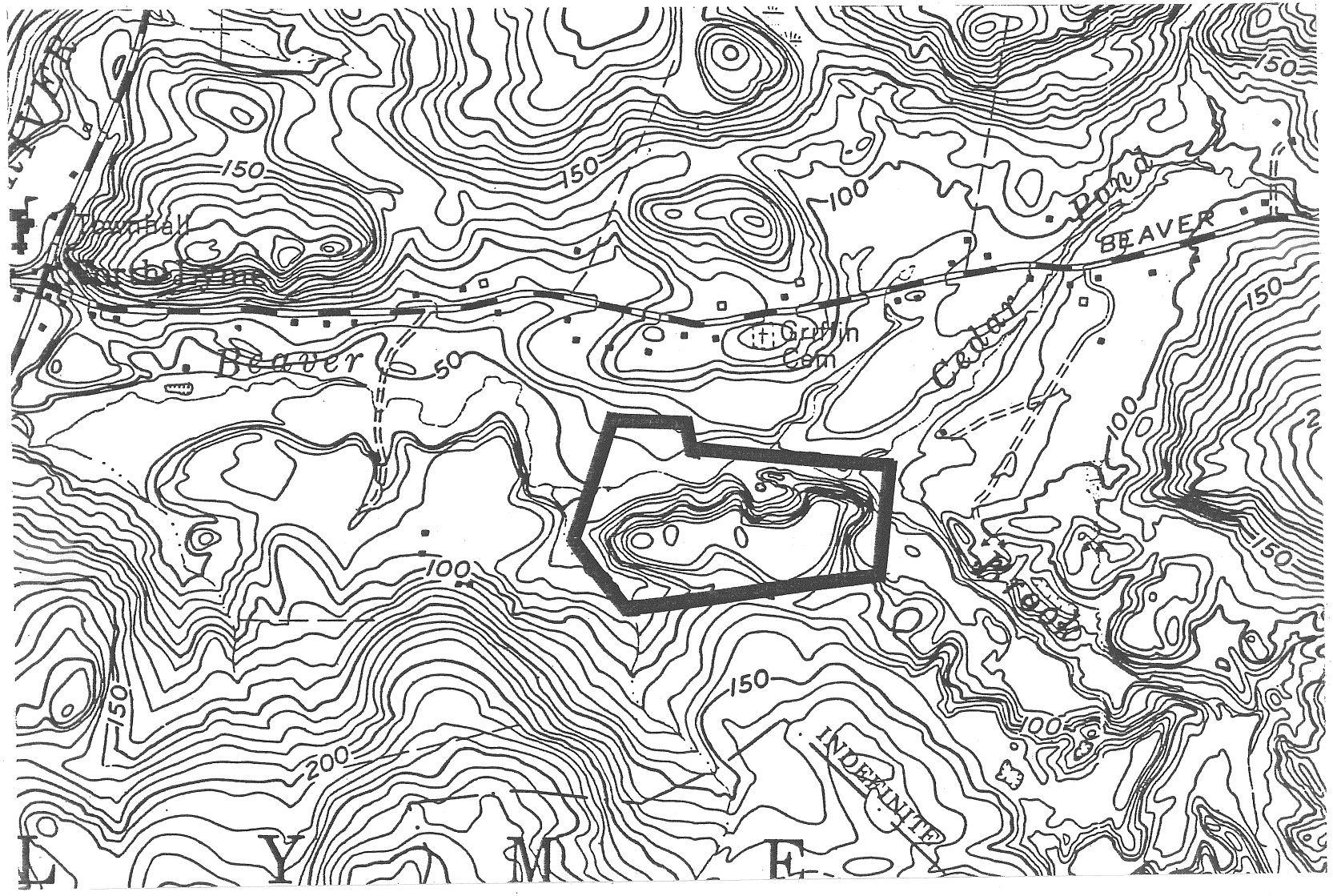
The development plans submitted by Salem Earth Products assume the entire ridge is composed of saleable material. However, only gravel on the ridge crest has been tested and there is some indication that the deposit becomes finer grained at lower levels. It would be prudent therefore, if Salem Earth Products was required to explore the full potential of the deposit prior to embarking on the project. A series of small pits on the flanks of the ridge would better define the likely extent of the future excavation. In the absence of this information Salem Earth Products should be asked how they propose to leave the site if they are forced to abandon the project at an intermediate stage? ■

Figure 1



Topographic Map

Scale 1" = 1000'



Soil Resources

Mark Edmonds, District Conservationist
USDA-Soil Conservation Service, New London County
Telephone: 887-4163

The Stream Crossing

The brook crossing is designed to handle 152 cfs. Peak flow was calculated using the TR-55 Graphical Discharge Method. Calculations provided use a drainage area of 361 acres. USGS topographic maps indicate that the watershed is much larger than this. The drainage area data should be reviewed for accuracy and for utilization of the most appropriate computation method.

The Detention Pond

A detention pond is planned to trap sediment during the final stabilization phase. This should be designed according the standards set forth in the Connecticut Guidelines for Soil Erosion and Sediment Control. *(Please see Wetland Review section Recommendation #4).*

Erosion and Sediment Control

Because of the steep slopes and the proximity of the wetlands erosion control is a major concern. Extreme care in implementing the erosion and sediment control plan is essential. The planned method of removal combined with silt barriers should provide the wetlands protection from siltation. Control measures should be regularly inspected and maintained throughout the life of the activity. The operator should be prepared to install any additional measures that are needed during the life of the operation.

If the proposed setbacks, sediment barriers, and method of removal are followed and the brook crossing properly installed, the proposed activity appears to be feasible with little or no off-site impacts in regards to erosion and sedimentation. *(Please see Wetland Review section Recommendation #3).*

Soils Descriptions

The primary soil type in the area of proposed activity is Hinckley gravelly sandy loam (see soils map). The soils along Beaver Brook are mapped as Rippowam fine sandy loam, a wetland soil. Additional soil series are Haven silt loam and Tisbury silt loam. Soil series descriptions are as follows:

HcB - Haven silt loam,
3 - 8 percent slopes

This gently sloping, well drained soil is on stream terraces and outwash plains. Permeability of the Haven soil is moderate in the surface layer and subsoil and very rapid in the substratum. The available

water capacity is high. Runoff is medium. Haven soil warms up and dries out rapidly in the spring. Unless limed, it is strongly acid or medium acid. This soil is well suited to cultivated crops. The hazard of erosion is moderate. This soil is suited to trees.

This soil is in capability subclass IIe.

HkA - Hinckley gravelly sandy loam, 0 - 3 percent slopes

This nearly level, excessively drained soil is on stream terraces and outwash plains. Permeability of the Hinckley soil is rapid in the surface layer and subsoil and very rapid in the substratum. The available water capacity is low. Runoff is slow. Hinckley soil warms up and dries out rapidly in the spring. Unless limed, it is strongly acid or medium acid. This soil is suited to cultivated crops. It is droughty and irrigation is needed. The hazard of erosion is slight. This soil is suited to trees.

This soil is in capability subclass IIIs.

HkD - Hinckley gravelly sandy loam, 15 - 35 percent slopes

This moderately steep and excessively drained soil is on stream terraces, outwash plains, kames, and eskers. Permeability of the Hinckley soil is rapid in the surface layer and subsoil and very rapid in the substratum. The available water capacity is low. Runoff is very rapid. Hinckley soil warms up and dries out rapidly in the spring. It is strongly acid or medium acid. This soil is poorly suited to cultivated crops because of the steep slopes. Hinckley soil is droughty. The hazard of erosion is severe. This soil is suited to trees. Steepness of slopes is the major limiting factor for community development.

This soil is in capability subclass VIIs.

Ro - Rippowam fine sandy loam

This nearly level, poorly drained soil is on flood plains of major streams, rivers, and their tributaries. The Rippowam soil has a seasonal high water table at a depth of about 6 inches. It is subject to frequent flooding. Permeability is moderate or moderately rapid in the surface layer and subsoil and rapid or very rapid in the substratum. The available water capacity is moderate. Runoff is slow. Rippowam soil warms up and dries out slowly in the spring. It is strongly acid or medium acid but has a medium acid layer within a depth of 40 inches. This soil is suited to cultivated crops. The hazard of erosion is slight. Areas that cannot be drained are poorly suited to crops. This soil is suited to trees. Windthrow is common because of the shallow rooting depth above the high water table. This soil is poorly suited to community development.

This soil is in capability subclass IIIw.

Ts - Tisbury silt loam

This nearly level to gently sloping, moderately well drained soil is on stream terraces and outwash plains. The Tisbury soil has a seasonal high water table at a depth of about 18 inches. Permeability is moderate in the surface layer and subsoil

and rapid or very rapid in the substratum. The available water capacity is moderate. Runoff is slow or medium. Tisbury soil warms up and dries out slowly in the spring. Unless limed, it is strongly acid or medium acid. This soil is well suited to cultivated crops. The hazard of erosion is slight. This soil is suited to trees. The major limiting factor for community development is the seasonal high water table.

This soil is in capability subclass IIw. ■

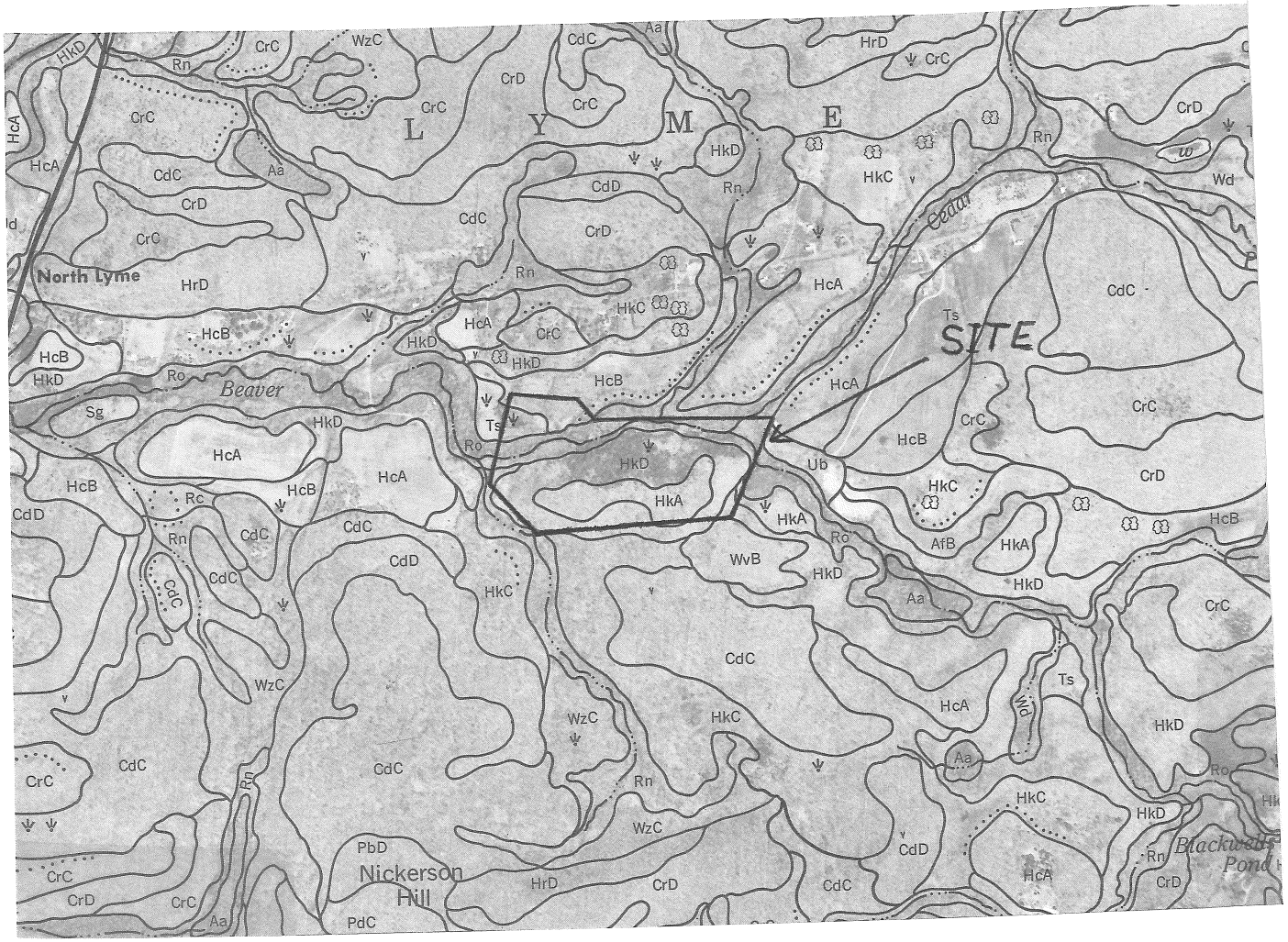
Soils Map

SCS-CONS-15
OCTOBER 1974

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP

Owner Robert Congdon — Operator Salem Earth Products, Inc. (Proposed)
County New London — State CT
Soil survey sheet(s) or code nos. #60 — Approximate scale 1" = 1320'
N
Prepared by U. S. Department of Agriculture, Soil Conservation Service cooperating with New London County Soil and Water Conservation District



Wetland Review

Doug Cooper, Supervising Environmental Analyst
DEP-Inland Water Resources Division
Telephone: 566-7280

Dan Mayer, Environmental Analyst
DEP-Inland Water Resources Division

Site and Project Description

The site under review is approximately 106 acres located within the Beaver Brook corridor in the Town of Lyme. The area proposed for excavation is composed of alluvial sands and gravels and forms a serpentine deposit approximately 2,000 feet long, 700 feet wide and 60-70 feet high. This feature is located directly adjacent to the southern bank of Beaver Brook and east of a small unnamed tributary stream. Beaver Brook is a resource of considerable value and quality and exists in a relatively undisturbed state along this portion of its length. The majority of the sand and gravel feature has been recently logged and access roadways are well established to and around the area, including the main access road which runs through Beaver Brook. The application is proposing to excavate approximately 1,000,000 cubic yards of sand and gravel over a ten year period. These activities would result in significant modification to the topography along this portion of the Beaver Brook corridor. Elevations along the entire crest of the deposit range from 130 to 138 feet, with a maximum elevation of approximately 139 feet. The proposed activities will reduce these elevations to approximately 62 to 70 feet after the final grade is completed. In addition to the excavation activities, improvements to the access roadway and a formal crossing of Beaver Brook will be required as a part of the proposed activities.

Project Impacts and Recommendations

The nature and scope of activities being proposed presents considerable potential to adversely impact wetlands and watercourses in the area. If the activities as proposed are conducted in a well planned and cautious manner such potential impacts could be reduced significantly. Real impacts to the water resources could be expected in such areas as water quality degradation, habitat loss and modification and long term channel morphology. All of these potential impacts would result from changes in the rate of sediment loading into the existing system over a long term period. Increased sediments could alter existing streambed conditions and thereby destroy or alter breeding areas and food sources for both fish and other aquatic wildlife. The elimination of a topographic feature of this size, and the creation of a relatively level landscape adjacent to the stream, may alter the streams long term

channel morphology or development. Such impacts could result in increased sediment movement downstream or changes in flood flows through the area. Significant impacts could occur to the vernal pool which is located on the site. During the site walk an abundance of evidence (large numbers of egg masses and tadpoles, hydrology sufficient to accommodate egg development) was observed which indicated that this area is used by a number of amphibian species including tree frogs and salamanders. Construction activities within 25 feet of this feature could have a significant impact on its hydrologic stability and function, and elimination of significant portions of habitat surrounding this feature could degrade its importance to and use by wildlife. Lastly, the proposed piped crossing of Beaver Brook will create a more permanent obstruction within the streambed than other potential crossings. While the piped plan may meet engineering specifications and be capable of passing anticipated flows through this area its susceptibility to clogging or becoming impassible to fish and other aquatic wildlife is greater than other types of crossings.

Based upon the an evaluation of the proposed activities and in light of the goal and intent of the Inland Wetlands and Watercourses Act, the following comments and recommendations are offered in the evaluation of this proposal.

1) In light of the quality of the Beaver Brook corridor and the potential for impacts from the proposed activities a minimum buffer of 100 feet from the wetland edge is recommended. A buffer area of this distance will not only increase the area of no disturbance but will maintain more of the natural bank and riparian area adjacent to the brook and will reduce some of the aesthetic impacts from the project. To enforce adherence to any setback or buffer which might be imposed upon this project, a fence erected at the established distance would aid both operators and site inspectors and reduce the likelihood of any potential misunderstandings.

2) It is the opinion of the DEP-Inland Water Resources Division that a box-culvert crossing of Beaver Brook would provide greater capacity for flow passage and better maintain the integrity of the stream bottom than the proposed crossing. While it can be argued that the proposed crossing is capable of both passing anticipated flows and allowing for fish passage, alternatives exist, such as a box culvert, which would be more feasible and prudent for these purposes. *(Please refer to the Fish Resources section for additional comments.)*

3) Given the nature of the activities proposed and the duration over which they will be performed, erosion and sedimentation controls and their maintenance may be the single most important factor in controlling and preventing impacts. Proper installa-

tion and stabilization of the access roadway and crossing will be critical to reducing sediment discharges directly into Beaver Brook. The proposed method of excavation will greatly reduce the potential for impacts from sedimentation, but should not be viewed as an infallible method.

4) If an increased buffer is imposed and the proposed excavation methods are employed properly there appears to be very little need for the proposed pond area. In light of the significance of the vernal pool and its sensitive hydrologic character it is recommended that if a pond is approved that it be placed a minimum of 150 feet from the nearest edge of the vernal pool system.

5) A formal replanting and final stabilization plan should be developed which would indicate the types (species) and specific locations of plantings, and types and application rates of any seed mixtures to be used.

Conclusion

In conclusion, the activities proposed will significantly modify the character of this reach of the Beaver Brook corridor. Significant modifications to the topography adjacent to the brook are proposed and should be considered in terms of their potential long term impacts to the system. Such modifications could increase sediment loads into the brook or influence the direction and height of flood events. While not proposed within the application, buffers of a minimum of 100 feet from the wetland edge would provide some protection from the proposed activities. The vernal pool located on the site is of special significance and efforts to maintain its existing hydrology should be made. Feasible and prudent alternative to the proposed piped crossing of Beaver Brook exist and should be considered, including box culverts. Erosion and sedimentation controls should be carefully implemented and maintained in order to minimize potential impacts. ■

The Natural Diversity Data Base

Nancy Murray, Sr. Environmental Analyst
CT DEP - Natural Resources Center
Telephone: 566-3540

The Natural Diversity Data Base maps and files regarding the project site have been reviewed. According to our information, there are no known extant populations of Federally Endangered and Threatened species or Connecticut "Species of Special Concern" occurring at the site in question.

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

Vegetation

Emery Gluck, Forester
DEP - Cockaponsett State Forest
Telephone: 345-8521

The vegetation of the property is common to the oak-hickory forest found in southern Connecticut. The vegetation can be divided into four forest stands(a mixed hardwood stand, hardwood swamp, a softwood/hardwood stand and old field vegetation). The acreage of the forest stands were obtained from aerial photographs and should only be used as estimates.

Vegetation Description

Stand 1 (mixed hardwoods) is a 28 acre mixed hardwood stand containing poles (trees 5.1" to 11" in diameter at breast height), saplings(trees 1.1" to 5" dbh) and scattered sawtimber (trees 11.1" dbh and larger). Scarlet oak, white oak, aspen, black birch, aspen, hickory and American beech are present. The lesser vegetation include American hornbeam, hophornbeam, lowbush blueberry, maple leaf viburnum, beech drop, princess pine and grass. Most of the smaller trees are 60 years old and the remaining sawtimber trees are 100 years old.

Stand 2 (hardwood swamp) is an 12 acre pole stand. Red maple, white oak, yellow birch, red oak, American beech, white ash, black gum are present. The understory includes spicebush, clethra, swamp azalea, witch hazel, American hornbeam, club moss, skunk cabbage, cinnamon fern, highbush blueberry, hophornbeam, and false hellabore. The stand is about 60 years old.

Stand 3 (old field) is a 2 acre sapling stand that has similar vegetation composition as Stand 1 but with the addition of red cedar.

Stand 4 (softwood/hardwood) is a 7 acre pole and sawtimber stand. Hemlock, beech, white oak, red oak, black oak, yellow birch, black birch, and American beech are present. Understory vegetation is sparse due to the dark shade of the hemlock. Black birch seedlings have germinated where openings have been made by harvesting individual sawtimber trees. The overstory hemlock are approximately 150 years old.

Vegetation and Water Runoff

Eastern forests are very absorptive because of their porous litter layer and permeable soils. Overland flow and subsequent erosion is very rare in undisturbed forests outside of stream channels. The cutting of forest vegetation rarely has an impact on increasing overland flow and erosion as the roots still hold the soil together for several years after the stems

have been severed and the forest floor is still as absorptive. Most overland flow and erosion occur when the litter layer has been significantly disturbed(or removed) and the soils have been compacted. This often occurs on unpaved roads, heavily used logging trails, and any other exposed soils. Most of the erosion currently taking place is associated with the access road as it gains elevation going south from the ford at Beaver Brook.

The greatest erosion potential that can be associated with the clearing of forest vegetation is in Stand 4 where the slopes reach a 70% grade. The unrestricted removal of all forest vegetation with logging equipment on very steep and erodible Hinckly soils will probably result in significant disturbance of the litter layer. In order to minimize the erosion potential associated with the removal of forest vegetation, the following is recommended:

- The clearing of forest vegetation (both cutting and removal) in Stand 4 should be done in a multiple step operation where one section at a time is cleared. The sections should be parallel to the contours. The first section should be at the top of the slope and only extend downslope far enough to accommodate the excavating of the first 10 foot lift. Subsequent sections for clearing should progress downslope only as fast as needed to accommodate subsequent 10 foot lifts. This will minimize the amount of slope exposed at a given time and a larger buffer will be retained for a longer period of time.

- The removal of all forest vegetation should be accomplished by winching the trees uphill. Log skidders normally have a 50 foot cable that should be able to reach all the trees to be cleared in a single section while operating the skidder from the top of the last lift.

- The slope below the most recent section cleared should be keep free of disturbances by barring all machinery from operating there.

Forest Vegetation and Noise Reduction

Research has shown that noise propagating through the forest can be reduced by 4 to 8 decibels per 100 feet. Holes in the forest canopy, such as those created for a house site, allow noise to be refracted into the hole from above the forest canopy. Retention of as much of an intact forest buffer as possible is recommended to help reduce the off site noise level.

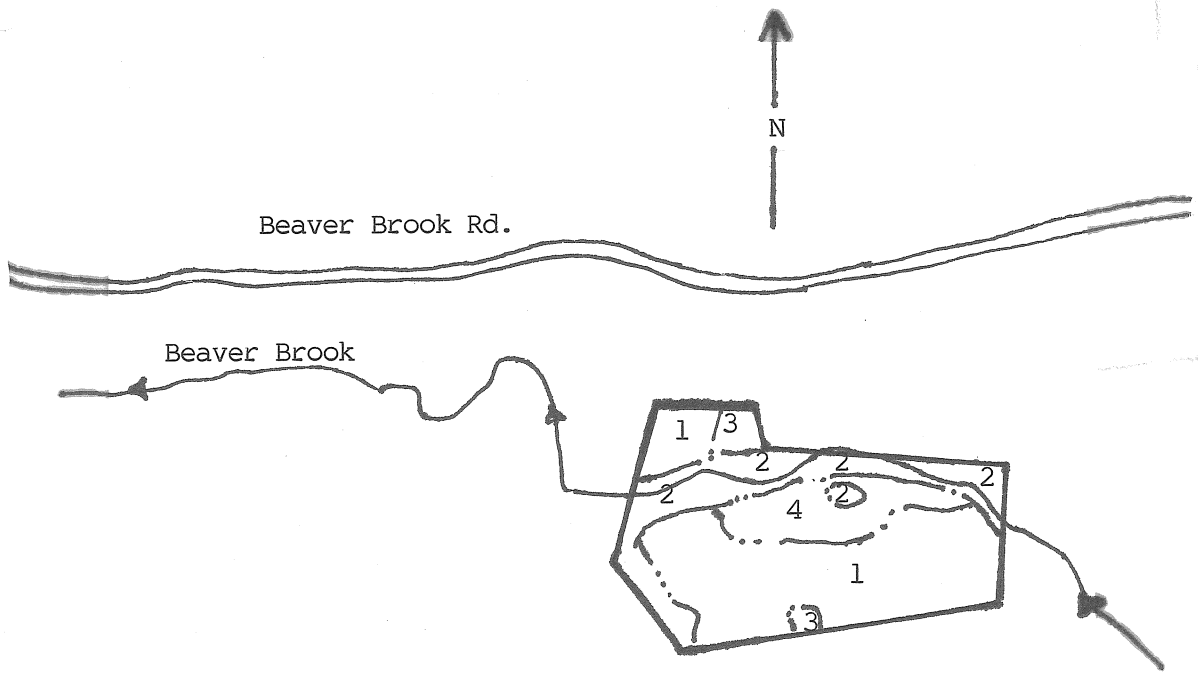
Revegetation

Once the final grade of the proposed project is reached, the area should be revegetated as soon as possible. Perennial rye or a similar cover crop should be planted to hold the soil. White pine and/or larch seedlings could be planted at a 10' spacing (435 trees per acre) if the owner wants a

forest instead of a field. Since it will take trees several years before they can provide as much protection against erosion as a cover crop, it is not recommended to plant trees without a cover crop. ■

Vegetation Map

Scale 1" = 1000'



Wildlife Resources

Steve Hill, Wildlife Biologist
DEP - Eastern District Headquarters
Telephone: 295-9523

Habitat Type Descriptions

The major habitat types include mixed hardwoods and wetlands.

Mixed Hardwood Forest: This habitat consists of a variety of hardwood species including oak, maple, birch, and hickory. Understory vegetation includes witchhazel, elderberry, multiflora rose, grape, blackberry and hardwood regeneration. Wildlife frequenting such habitat types include deer, fox, raccoon, gray squirrel, woodpeckers (pileated, hairy and downy), ovenbirds, scarlet tanangers, black-throated blue and green warblers.

Wetland/Riparian Habitat: This habitat type consists of streams and associated wetland habitat. A small wetland depression area is located near a proposed sedimentation basin. This vernal pool is an important habitat feature for various amphibian species whose existence depends upon this habitat type for breeding.

Impacts of Development

Upland Wooded Areas: Fragmentation and loss of habitat will lead to a decline in species diversity and richness. Wildlife populations will be reduced in proportion to the amount of habitat lost.

Wetland/Riparian habitat: Wetlands support a high diversity of wildlife due to the complexity of the vegetative structure, high productivity and abundant food supply which allow for a high carrying capacity (Brown et. al. 1978). There are many species that require access to streams or water body margins for survival even though they may spend much of their time in other habitats (Milligan and Raedeke 1986). Part of the food supply for many vertebrates is the high abundance and diversity of insect populations that are typical of wetland ecosystems (Brown et al. 1978). Wetlands presently provide important habitat for a variety of wildlife species and function as areas for absorption of natural runoff.

Vegetation removal in wetlands may have severe impacts on wildlife, especially reptiles and amphibians. One or several of the cover, food, breeding habitat, and hibernation areas may be altered. Species dependent on specialized habitat are eliminated and more adaptable species are reduced in numbers (Campbell 1973). To minimize impact maintain a 100 foot wide buffer zone of vegetation around wetland/riparian areas.

Mitigation of Disturbances

1. Maintain a 100 foot wide buffer zone of natural vegetation around wetland/riparian areas to help filter and trap silt and sediments.

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Fish Resources

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This report will address anticipated impacts to local aquatic resources and delineate appropriate measures to mitigate impacts.

Fish Population

Beaver Brook, a tributary of the Eight Mile River, borders the proposed sand and gravel excavation. A 150 meter stretch of this stream was sampled in July 1989 by the DEP Inland Fisheries Stream Survey Team. Results of the survey determined that this watercourse supports a diverse assemblage of stream fishes. Survey results show that the following finfish dominated the local fisheries populations: native brook trout, longnose dace, common shiner, fallfish, and American eel (Hagstrom et al. 1990). Other stream dwelling species found were: blacknose dace, tessellated darter, white sucker, chain pickerel, redfin pickerel, and sea lamprey.

Surface waters of Beaver Brook are classified as "Class A". Designated uses for this classification are: potential drinking water supply, fish and wildlife habitat, recreational use, agricultural and industrial supply, and other legitimate uses.

The exact fish assemblage of the unnamed intermittent feeder stream on the property is not known; although, it is expected that several species of fish may seasonally inhabit this watercourse near its confluence with Beaver Brook. During the field review on 23 April, 1991, yearling brook trout were observed in the lower stretch of this unnamed watercourse.

Impacts

The following impacts can be expected if proper mitigation measures are not implemented:

1. Site soil erosion and sedimentation of Beaver Brook from sand and gravel excavation activities. Without careful long-term planning and frequent site inspections, mining activities within and adjacent to steep sloped land that is contiguous with Beaver Brook may introduce suspended sediments. If not properly contained, sediments and resultant turbid waters will cause stream degradation. Excessive sediment deposition could damage the aquatic ecosystem of Beaver Brook in the following ways:

(1) Sediment reduces the survival of resident fish eggs and hinders the emergence of newly hatched fry. Adequate water flow, free of excess sediment particles is required for fish egg respiration and successful hatching.

(2) Sediment reduces the survival of aquatic macroinvertebrates. Since aquatic insects are important food items in fish diets, reduced insect populations levels in turn will adversely affect fish growth and survival. Fish require an excessive output of energy to locate preferred prey when aquatic insect levels decrease.

(3) Sediment reduces the amount of usable habitat required for spawning purposes. Excessive fines can clog and even cement gravels and other desirable substrate together. Resident fish may be forced to disperse to other areas not impacted by siltation.

(4) Sediment reduces stream pool depth. Pools are invaluable stream components since they provide necessary cover, shelter, and resting areas for resident fish. A reduction of usable fish habitat can effectively limit fish population levels.

(5) Turbid waters impair gill functions of fish and normal feeding activities of fish. High concentrations of sediment can cause mortality in adult fish by clogging the opercular cavity and gill filaments.

(6) Sediment encourages the growth of filamentous algae and nuisance proportions of aquatic macrophytes (CTDEP 1989). Eroded soils contain plant nutrients such as phosphorous and nitrogen. Once introduced into aquatic habitats, these nutrients function as fertilizers resulting in accelerated plant growth.

(7) Sediment contributes to the depletion of dissolved oxygen (CTDEP 1989). Organic matter associated with soil particles is readily decomposed by microorganisms thereby effectively reducing oxygen levels.

2. Road construction within Beaver Brook. Placement of multiple culverts in Beaver Brook may prevent resident fish passage due to: **(1)** increased water velocities within culverts during periods of high river flows, and/or **(2)** insufficient water depth within culverts during summer low flow conditions. Moreover, culvert placement results in the direct loss of instream fisheries habitat since the local stream bottom will be replaced with artificial materials. Instream culvert placement in concert with placement of fill for road construction will inevitably result in stream sedimentation problems if proper erosion and sedimentation controls are not followed. Impacts due to stream sedimentation were previously discussed. Preliminary plans show that all four 36" diameter culverts will be sunken 1 foot below stream grade. This installation strategy is not suitable for this particular stream crossing since fish passage may still be impeded.

Recommendations

The following recommendations are provided to assist with the mitigation of the previously outlined impacts.

1. Maintain at the minimum, a 100 foot open space buffer zone. This zone is to be measured from The edge of the delineated riparian wetlands adjacent to Beaver Brook. No excavation shall take place in this zone, otherwise the ability of

the buffer zone to function properly, especially as a nutrient filter/trap, will be reduced. Research has shown that 100 foot buffer zones help prevent damage to wetlands and stream ecosystems that support diverse fish and aquatic insect life (USFWS 1984;USFWS 1986;0DFW 1985).

2. Develop an aggressive and effective erosion and sediment control plan. It appears that the excavation trench in conjunction with such mitigative measures as filter fabric barrier fences, and staked hay bales may satisfactory control soil runoff at the project site. The applicant and the Lyme wetland enforcement officer should be responsible for checking this development on a periodic basis to ensure that all soil erosion and sediment controls are being maintained. In addition, the applicant should post a performance bond with the town to protect against future soil erosion violations. Past stream siltation disturbances in Connecticut associated with sand/gravel developments have occurred when individual contractors either improperly deployed mitigation devices or failed to maintain these devices on a regular basis.

3. Beaver Brook should be crossed with box culverts. The existing culvert design, four 36" diameter culverts sunken 1 foot below stream grade may impede passage in Beaver Brook over time. These multiple culverts tend to require frequent maintenance due to the accumulation of woody stream debris. It is recommended that multiple box culverts be utilized at this crossing, especially if the crossing it to be in place at least a ten year period. One of the box culverts, positioned such that it hydraulically conveys the majority of Beaver Brook's summer low flow regime, should be sunken one foot below stream grade. Other boxes may be installed at existing streambed elevation or 6 inches below grade. Instream culvert placement may require a State of Connecticut Water Diversion Permit and as such, the applicant should contact the DEP Water Diversion Program Coordinator, Mr. Bob Gilmore, at 566-7160 for further details.

4. All instream work and land grading/filling near Beaver Brook should take place during low flow periods. This will help minimize the impact to the aquatic resources. Reduced streamflows and rainfall during the summer and early fall provide the least hazardous conditions in which to work near sensitive aquatic environments.

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Planning Considerations

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Zoning and Plan of Development

According to the Lyme Zoning Map, the proposed earth removal operation site is located in an RU-80 Zoning District. The principal permitted use in an RU-80 District is the construction of single family dwellings. Conversion of older structures to two family dwellings is also allowed under limited circumstances. Also permitted are home occupations, letting of rooms to boarders, and various agricultural uses. Other more intensive uses may be considered under special permit. Earth removal operations are allowed in any zoning district except the Conservation Zone, including the RU-80 District, subject to site plan approval by the Planning and Zoning Commission, under the requirements of Section 10 of the Zoning Regulations. Revised regulations for earth removal operations were recently adopted by the Planning and Zoning Commission, effective April 10, 1991, but are under appeal as of the date of this review.

The Lyme Plan of Development, adopted in November 1990, shows the desirable long term use of the site as "rural residential". As a part of the Plan preparation, a questionnaire was distributed to Lyme residents asking their opinion on the future development of Lyme. The questionnaire results showed that residents strongly support retention of the rural character of the town and indicated strong support for preservation of the open space. The questionnaire also indicated that residents feel that present active recreational facilities are adequate. The Regional Plan of Development for the Connecticut River Estuary region, adopted in 1975, shows the long term development of the northern portion of Lyme as a proposed "rural area", at least through the year 2000.

The area surrounding the proposed gravel excavation site is lightly developed, with single family residential development typically located close to Beaver Brook Road, although a few scattered residences are located at some greater distance from the road. The closest residence is about 1000 feet to the west of the site. There is also an existing gravel operation immediately to the east of the site, and an active sawmill located across Beaver Brook Road to the northeast. The northern boundary of Nehantic State Forest is located about 1000 feet to the south of the site.

Access and Traffic

The site is currently accessed by an existing dirt logging road, connecting to Beaver Brook Road. Beaver Brook Road

connects to Route 156 about 1.2 mile to the west, and intersects with Gungy Road and Grassy Hill Road about 1.5 miles to the east. Beaver Brook Road provides access for the strip residential development along the road, as well as the existing gravel operation and the sawmill. According to information presented in the Lyme Plan of Development, there were eight accidents on Beaver Brook Road between 1985 and 1988, second in number only to Mt. Archer and Grassy Hill Roads with 9 each. The Plan of Development also listed the intersection of Beaver Brook, Gungy and Grassy Hill Roads as the intersection with the highest number of accidents in Lyme. At present, thru truck traffic is not allowed on Beaver Brook Road. Trucks exiting from the existing gravel operation are required to go west to Route 156. Beaver Brook Road is narrow and winding, with steep grades in some areas, particularly immediately west of the intersection with 156. The sight line at the point of the existing dirt road's intersection with Beaver Brook Road is adequate to the east, but is limited by a steep knoll on Beaver Brook Road to the west.

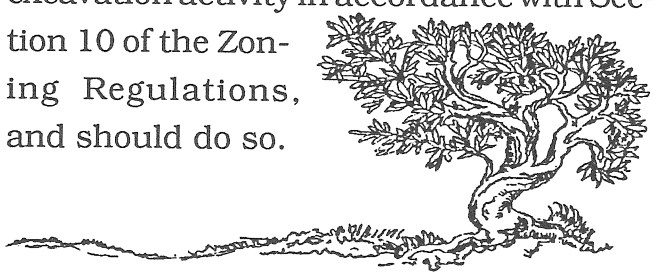
Information on the actual scope and level of activity at the proposed gravel operation was not available to the Environmental Review Team at the time of the review. The boundaries of the actual area of excavation have not been determined. While there is potential for removal of up to one million cubic yards of material, the actual volume of material to be removed is not known, and will depend on the quality and quantity of material found on the site during excavation operations. The number of trucks per day which would visit the site was not available, but will undoubtedly depend on the market for gravel in the area. The potential number of truck trips per day is limited almost solely by the ability of the operator to excavate material and the number of trucks available for transport. The width of the access driveway and maneuvering room on site would be one additional limiting factor, however. The access road as shown is only ten feet wide, and would not allow for two way traffic either entering or within the site, limiting the flow of truck traffic. The developer estimates that the site could be operational for up to 15 years. Some trucks will belong to the operator, and some will belong to other contractors. The destination of the trucks leaving the site is unknown, although it was noted that there is an immediate demand for a substantial quantity of material as part of the construction of the new Baldwin Bridge across the Connecticut River between Old Lyme and Old Saybrook. Truck traffic would be directed entirely to Route 156, and then either north to Route 82 or south to I-95.

Impact and Noise

The proposed gravel operation will impact the surrounding area in several ways. Although the excavation will not be easily visible from the road, it will be visible to some residences across the valley, on Beaver Brook Road, due to its elevation. The use of buffers will not screen the

operation from view, since it is located above the valley floor and Beaver Brook. While buffers can mitigate the impact on the water quality and provide some shielding for immediately adjacent lands, buffers in this instance will not provide relief from the visual impact. Removal of up to 70 feet of material from the hilltop will permanently change the shape and appearance of the valley. Ultimately, when the project is completed and the area is reforested, the negative visual impact will be minimal, but this could be several decades in the future.

There is a potential for some noise from the site during operation. It's not possible to acoustically buffer the operation, due to topography. Any noise generated at the site will be heard along and across the valley. The potential for noise comes from the use of heavy machinery and truck operation. While not inherently loud, the sound of trucks and equipment backing up, as well as general engine noise, cannot be eliminated. There is noise now, however, from the existing gravel operation and from the sawmill. Thus, the additional machinery sounds would not be intruding on a soundfree environment. The Planning and Zoning Commission has the ability to restrict hours of operation of any new excavation activity in accordance with Section 10 of the Zoning Regulations, and should do so.



Truck Traffic and Site Line

The amount of truck traffic which would be generated by the gravel operation is unknown, but potentially very high. Beaver Brook Road is just sufficiently wide enough to allow for passage of two large vehicles when both drivers keep to their own side of the road. Beaver Brook Road is narrow, with several hills and blind curves, and is bordered by fixed objects including embankments, trees and rocks. Due to the narrowness and lack of shoulders on the road, many automobile drivers may be hesitant to continue when meeting a large truck. If substantial truck traffic is anticipated, minor improvements to Beaver Brook Road would be appropriate, including striping of a center line, and removal of several trees and rock outcroppings that are located virtually within the travelled portion of the roadway. Route 156 is also a less than ideal route for heavy truck traffic, particularly to the south of Beaver Brook Road, due to narrowness, sharp curves and blind road and driveway intersections in both Lyme and Old Lyme.

The sight line at the access point is good to the east, but limited to the west by vegetation and by the knoll. Part of any plan for use of the site should include raising the elevation of the entrance, clearing obstructing brush, and installing warning signs to the west of the driveway indicating "trucks entering". Plans for the complete access road were not available to the Environmental Review Team, but information shown on the available plans

indicate a ten foot wide travel driveway. This is not adequate for two-way truck traffic. The driveway should be designed so that trucks can meet and pass both at the entrance to Beaver Brook Road and within the site, to avoid trucks waiting to enter the driveway, out on Beaver Brook Road.

Effect on the Landscape

When the gravel extraction operation is completed, the plans indicate that final grades will create a sloping plateau at a height 10 to 15 feet above Beaver Brook. The plateau will somewhat bowl-shaped, being lower in the middle than along the edges. This extremely dramatic alteration of the natural landscape will remove a hill and widen the low valley floor. Residential development or other permitted development of the site with its current topography is limited due to steep slope. While the site has some potential for recreation, the townspeople have indicated in the Plan of Development questionnaire that they do not feel that the town needs additional active recreation. In its altered form, following gravel extraction, the site is potentially more readily developable for residential use, although actual development depends on soil conditions found during excavation and the condition in which the site is left at the completion of the excavation activity. Final grades should be designed to maintain grade at a sufficient distance above the water table to allow for installation of on-site septic systems in conformance with Public Health Code requirements. Soils which are suitable for gravel extraction are likely to require additional separation distance between any on-site wells and septic systems. The Town of Lyme allows creation of flag lots using common driveways, and the service road for the gravel operation has the potential to serve as a future access road to residential lots if constructed to adequate width initially.

The proposed activity has the potential for having a dramatic effect on the landscape, by completely altering the existing landform. The Planning and Zoning Commission may wish to consider placing limits on the scope of the operation so that some of the topographical flavor of the existing landform remains. The change from a large hill to a smaller hill is less dramatic than from a large hill to a bowl-like plateau. Gravel is important natural resource necessary for the continued economic development of the region, but a balance should be struck between use of an important resource and complete obliteration of existing natural conditions.

Any permit for the conduct of a gravel operation at the site should also include a phasing plan, so that at any stage in the extraction, the task of regrading and closing the operation is not overwhelming. By minimizing the amount of disturbed area at any given point in the operation, not only is the environmental impact reduced, but the effort involved in switching to other attractive and productive use of the site is greatly reduced as well. ■

Archaeological Review

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Review of Files

A review of the State of Connecticut's Archaeological Site Files and Maps show a prehistoric Indian encampment located in the project area. Beaver Brook Site (75-51) was reported to our office in 1983 during an archaeological survey of the Town of Lyme, conducted by the Public Archaeology Survey Team, Inc., University of Connecticut, Storrs. Little information currently exists concerning this site. One stone tool was recovered from a small test excavation. This site is probably the remnant of a fishing camp along Beaver Brook utilized sometime in the prehistoric past. In addition, seven other prehistoric archaeological sites have been recorded in the immediate vicinity of the project area which indicates the areas intensive utilization by Native American cultures in the past.

On-Site Review

An on-site review of the general project area indicates that the Village of North Lyme appears to be eligible for the National Register of Historic Places. Further, properties of historic and architectural interest are located along Beaver Brook Road. Beaver Brook Road might qualify as a town-designated "Scenic Road" with its mature tree species and stonewall system. The proposed excavation operation will not appear to have a physical or visual impact on any of the above historic properties. However, a substantive increase in truck traffic may adversely effect the overall ambience and rural character of the North Lyme community. Resolution of this traffic concern would appear to be an important issue for local decision-making.

Recommendations

Based upon environmental, topographic and site inventory data, the project area warrants a professional archaeological investigation in accordance with the Connecticut Historical Commission's ENVIRONMENTAL REVIEW PRIMER FOR CONNECTICUT'S ARCHAEOLOGICAL RESOURCES. The Office of State Archaeology highly recommends that the Beaver Brook Site (75-51) be mitigated prior to any mining operation. In addition, an archaeological reconnaissance survey should be conducted in the project area to locate and identify any further sites which might exist.

The Office of State Archaeology is prepared to offer the Town of Lyme and Salem Earth Products, Inc. any technical assistance to ensure the preservation and

conservation of all cultural resources in the project area.

Summary

In summary, at least one archaeological has been identified in the project area. The Office of State Archaeology and the Connecticut Historical Commission recommends a cultural resource management plan for this site and an archaeological survey to identify other potential sites. In addition, traffic concerns effecting the historic and rural character of the North Lyme community should be considered. ■

ABOUT THE TEAM

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

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

PURPOSE OF THE TEAM

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

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

REQUESTING A REVIEW

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

For additional information and request forms regarding the Environmental Review Team please contact the ERT Coordinator: 203-345-3977, Eastern Connecticut RC&D Area, P.O. Box 70, Haddam, Connecticut 06438.