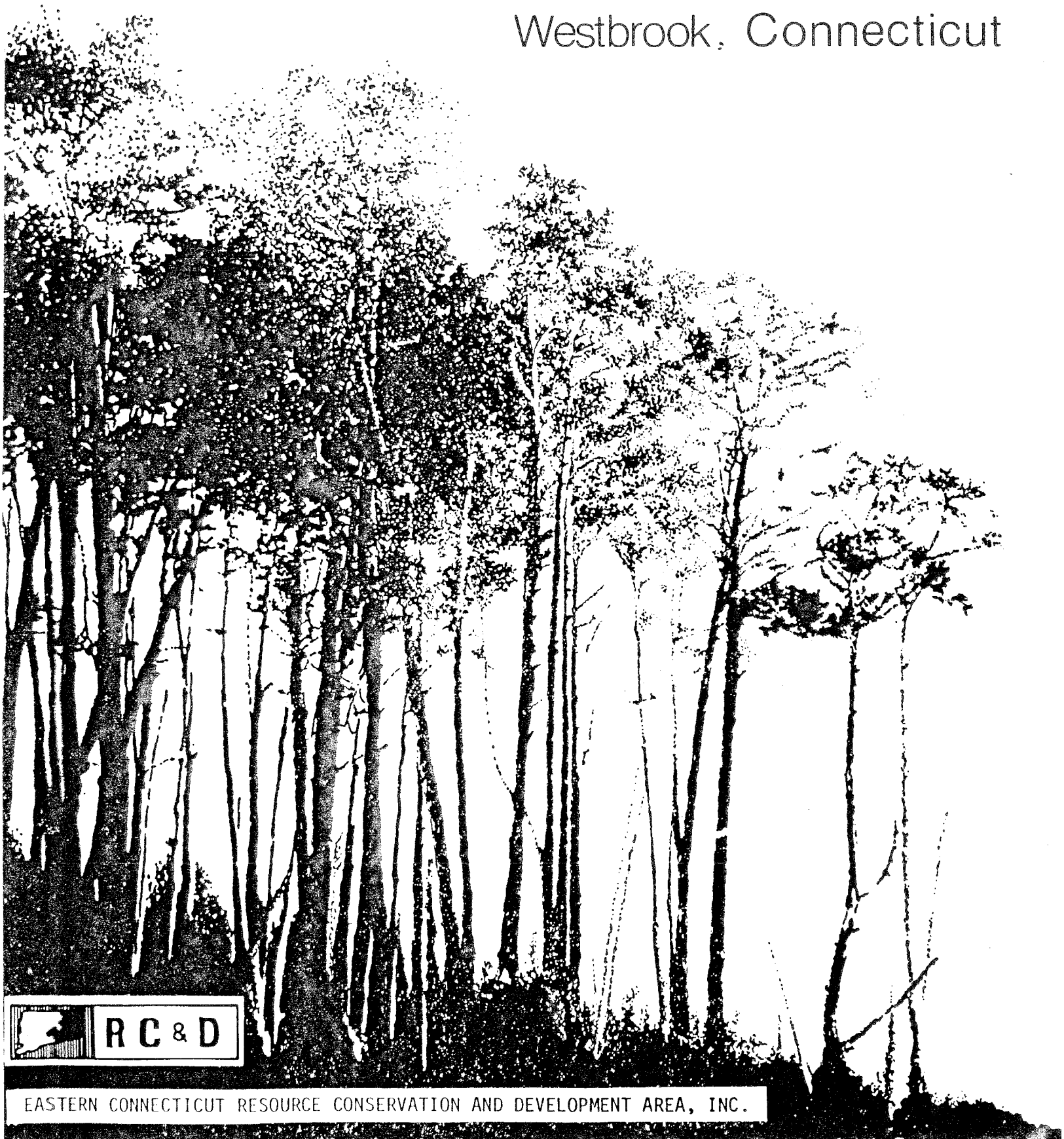
Environmental Review Team Report

Mine Swamp Excavation

Westbrook, Connecticut



RC&D

EASTERN CONNECTICUT RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

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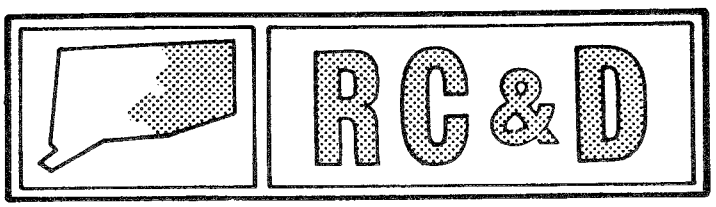
November 1984

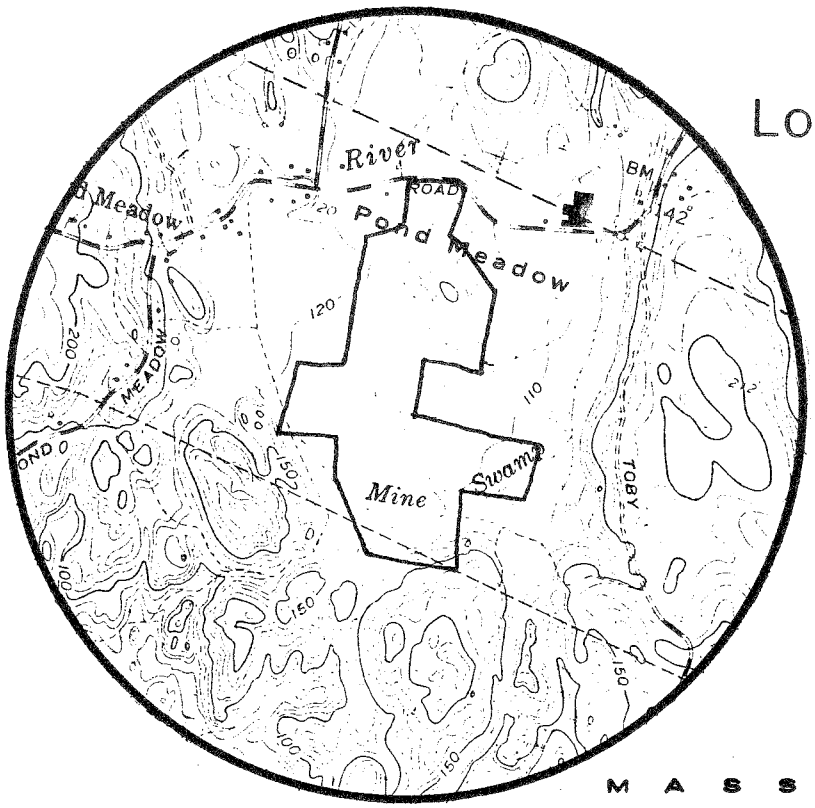


Eastern Connecticut Resource Conservation & Development Area

Environmental Review Team
PO Box 198
Brooklyn, Connecticut 06234

Location of Study Site

MINE SWAMP EXCAVATION
WESTBROOK, CONNECTICUT



EASTERN CONNECTICUT
RESOURCE CONSERVATION AND DEVELOPMENT PROJECT

ENVIRONMENTAL REVIEW TEAM REPORT
ON
MINE SWAMP EXCAVATION
WESTBROOK, CONNECTICUT

This report is an outgrowth of a request from the Westbrook Zoning and Conservation Commissions to the Middlesex County Soil and Water Conservation District (S&WCD). The S&WCD referred this request to the Eastern Connecticut Resource Conservation and Development (RC&D) Area Executive Committee for their consideration and approval. The request was approved and the measure was reviewed by the Eastern Connecticut Environmental Review Team (ERT).

The soils of the site were mapped by a soil scientist from the United States Department of Agriculture, Soil Conservation Service (SCS). Reproductions of the soil survey map, a table of soils limitations for certain land uses and a topographic map showing property boundaries were distributed to all Team members prior to their review of the site.

The ERT that field checked the site consisted of the following personnel: Pat Scanlon, District Conservationist, Soil Conservation Service (SCS); Marc Beroz, Soil Specialist, SCS; Bill Warzecha, Geologist, Connecticut Department of Environmental Protection (DEP); Emery Gluck, Forester, DEP; Richard Joly, Regional Planner, Connecticut River Estuary Regional Planning Agency; Judy Wilson, Wildlife Biologist, DEP; and Jeanne Shelburn, ERT Coordinator, Eastern Connecticut RC&D Area.

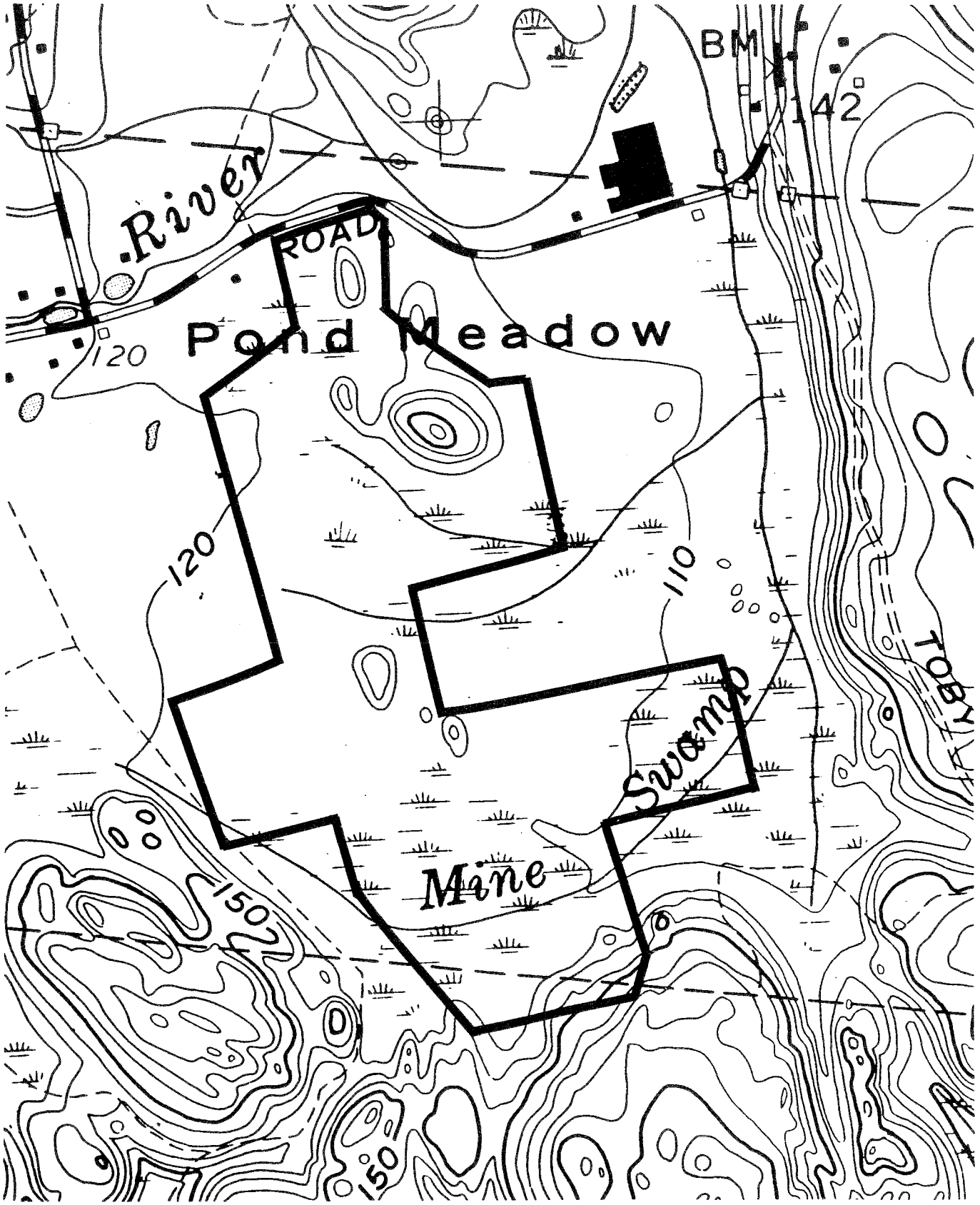
The Team met and field checked the site on Thursday, September 30, 1984. Reports from each contributing Team member were sent to the ERT Coordinator for review and summarization for the final report.

This report is not meant to compete with private consultants by supplying site designs or detailed solutions to development problems. 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 of Westbrook. The results of this Team action are oriented toward the development of a better environmental quality and the long-term economics of the land use.

The Eastern Connecticut RC&D Area Committee hopes that this report will be of value and assistance in making any decisions regarding this particular site.

If you require any additional information, please contact: Ms. Jeanne Shelburn, Environmental Review Team Coordinator, Eastern Connecticut RC&D Area, Route 205, Box 198, Brooklyn, CT 06234, 774-1253.

Topography	Site Boundary	0 660' scale	N



INTRODUCTION

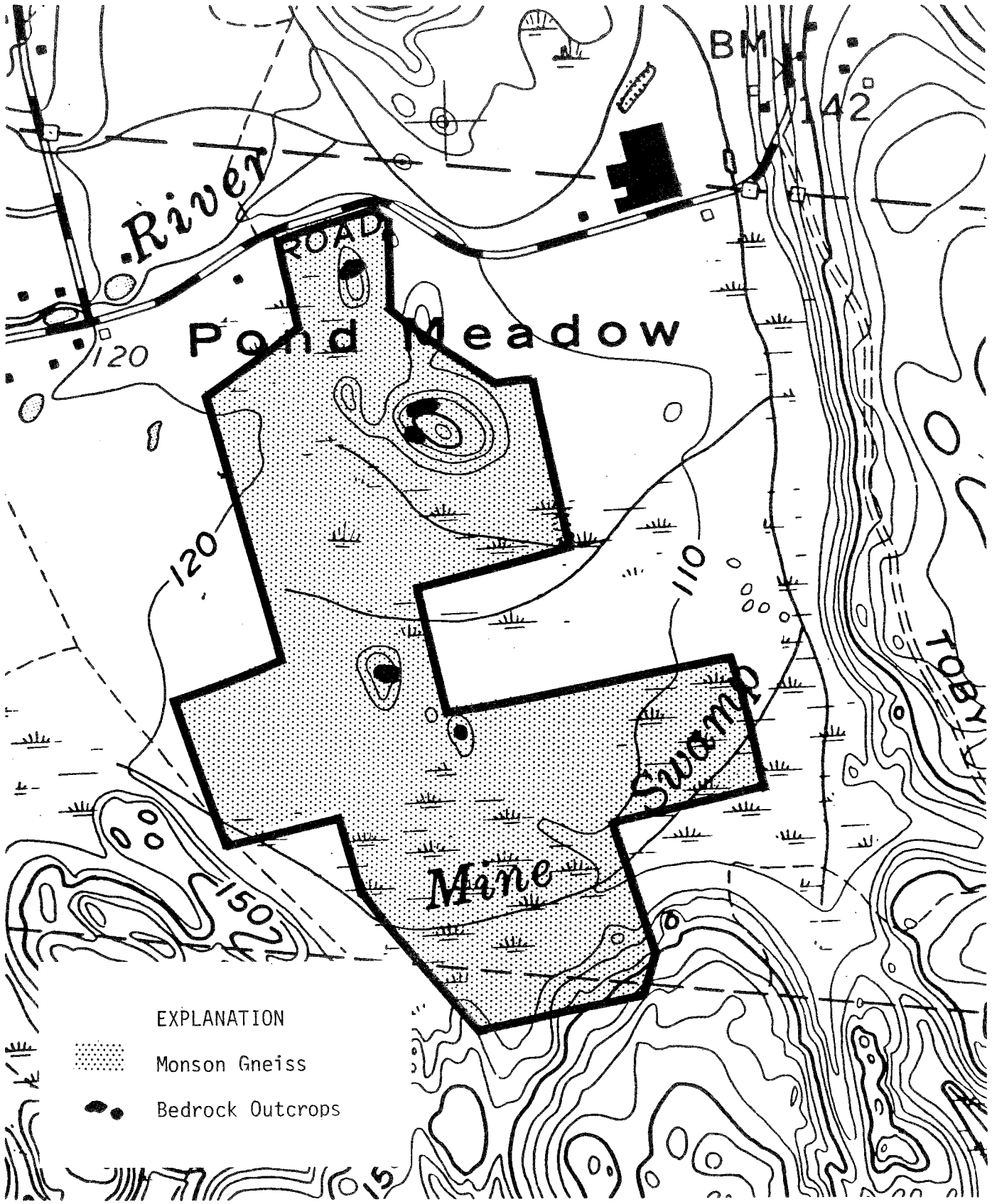
The Eastern Connecticut Environmental Review Team was asked to prepare an environmental assessment of a proposed gravel excavation in the Town of Westbrook. The site is approximately 98 acres in size and is located on the south side of East Pond Meadow Road. The site will be mined by Connecticut Valley Sand and Stone. Preliminary plans for the excavation have been prepared by Angus McDonald and Associates, an Old Saybrook engineering firm.

Preliminary plans show excavation of a 55 acre area to a depth of approximately 20 feet. This would amount to approximately 1,700,000 cubic yards of earth materials. Generally, 20 truck loads (40 trips) per day would be removed from the site, resulting in a ±28 year operation of the excavation. Since a major portion of the 55 acre excavation site is a wetland area, a pumping and dewatering process will be used in the phased excavation. Access to the site will be from East Pond Meadow Road. After completion of the excavation, the developer is planning to donate the resulting pond and adjacent land on the property to the Town for recreational purposes.

The site is entirely forested at present except for a seven acre open field. The topography is relatively flat. The most notable natural feature on the site is the large wetland in which the excavation will occur.

The Team is concerned with the effect of this proposed excavation on the natural resource base of this site. A number of potentially serious impacts have been identified during this investigation. These include the impact on the Town road systems in Westbrook, ESsex and Deep River where the materials will be processed; the impact on adjacent properties and on dug wells on Green Meadow Drive during the dewatering process; the impact of potential hydrocarbon contamination of the underlying acquifer by accidental spills from trucks and mining equipment; and the impact of wetland loss on downstream sedimentation. These issues and potential mitigation measures are discussed in detail in the following sections of this report. The Team hopes that this information will be helpful to the Town and developer in making future decisions about this proposal.

Bedrock Geology



ENVIRONMENTAL ASSESSMENT

TOPOGRAPHY

Land surface throughout the site is relatively flat. Several bedrock controlled knobs in the northern and central parts of the property rise moderately from these flat areas. According to the Essex topographic quadrangle published by the U.S. Geological Survey (USGS), three stream courses traverse the parcel in an easterly direction. Maximum and minimum elevation on the parcel are ±160 feet and 110 feet above mean sea level, respectively.

GEOLOGY

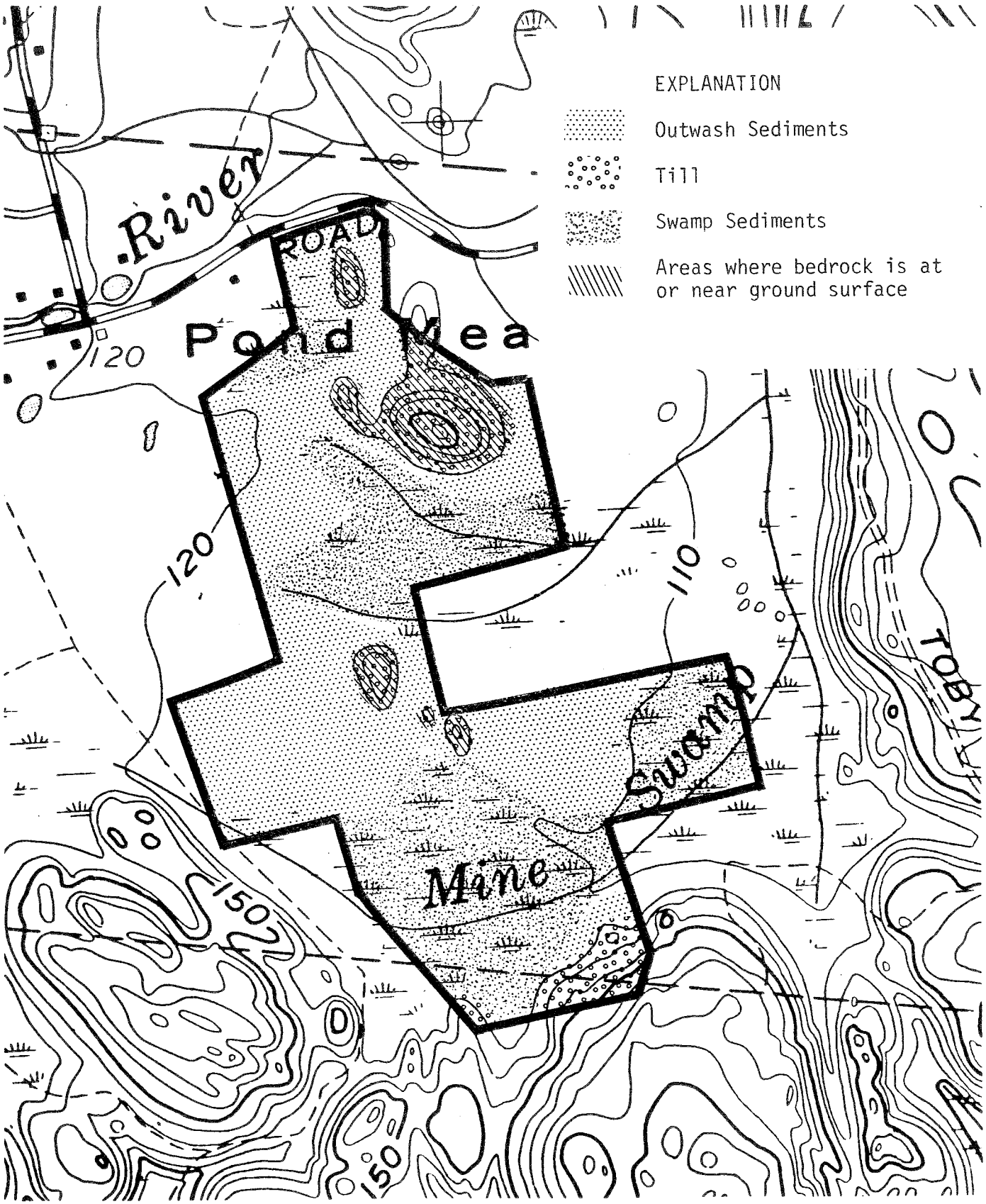
The subject parcel is located in an area encompassed by the Essex topographic quadrangle. A bedrock geologic map (QR-15, by Lawrence Lundgren, Jr.) and surficial geologic map (QR-31, by Richard Foster Flint) for the quadrangle have been published by the Connecticut Geological and Natural History Survey.

Bedrock outcrops are visible on the small knobs found within the property. The rock type is described as Monson Gneiss, which consists of a light gray gneiss composed of plagioclase, quartz, biotite and hornblende. The rock is interbedded with amphibolite (amphibole-bearing rock) and pink alaskitic granite. "Gneisses" are rocks in which bands of elongate minerals alternate with bands of minerals that have a blockier or more rounded shape. The term "amphibolite" refers to rocks that are composed of amphibole group minerals. Some amphibole minerals include hornblende, actinolite, and tremolite. Both gneisses and amphibolites are metamorphic rocks; that is, rocks which have been subjected to great heat and pressure within the earth crust.

Those unconsolidated mineral and organic materials (surficial deposits) overlying bedrock within the property consist of outwash sediments, swamp sediments, and till. Till and outwash sediments both are of glacial origin. The distribution of these surficial deposits are shown on the accompanying Surficial Geology map.

Glacial ice formerly flowed through the State, accumulating rock particles and fragments, which range in size from clay to large boulders, as it eroded the pre-existing soils and bedrock. In most unpland areas, the debris from the ice sheet was redeposited directly from the ice without substantial reworking by meltwater streams. This material is known as till. Till is a texturally complex sediment composed of rock particles and fragments ranging in size from clay to boulders. The upper few feet of till is commonly sandy, stony and friable; at depth it becomes siltier and more tightly compacted. Till

Surficial Geology



covers the small knobs within the property as well as along the southern boundary. Thicknesses of the till on the property probably do not exceed 10 feet.

As the glacier began to retreat, it melted in upland areas and became restricted to valleys. Meltwater streams emanating from the glacier, carried the accumulated rock particles and fragments from the stagnant portions of these ice "tongues" depositing the material both near and far from the ice. Where deposited near the ice, the meltwater sediments, which are known collectively as "ice contact stratified drift," principally consisted of medium to coarse sand and gravel. Where deposited beyond the limit of the ice, sediment contained higher proportions of fine sand, silt and occasionally clay. The latter type of deposit, which is referred to as "outwash sediment," is the predominant surficial deposit covering the parcel. It consists generally of sorted sands and gravels and is usually absent of cobble and boulder (coarse) size gravel. The coarser grained material (ice-contact stratified drift) is not found within the site. However, ice-contact stratified drift deposits are found in the northern, eastern, and southern parts of the quadrangle. Connecticut Water Resources Bulletin No. 10 (Lower Connecticut River Basin) suggests the outwash sediments found on the site are thickest (about 40 feet) in the central portions. Eleven test borings which ranged between 7.5 feet and 41.5 feet below ground surface were drilled throughout the property. The logs of the borings indicate that the outwash deposits found on the property generally consist of sands and gravels of varying grain size near the surface, but grade into a fine to medium grained sand at depth. According to the applicant, the top 15 to 20 feet of material over 55 acres would be excavated. It is presumed the material will be used as aggregate for construction uses and/or fill material.

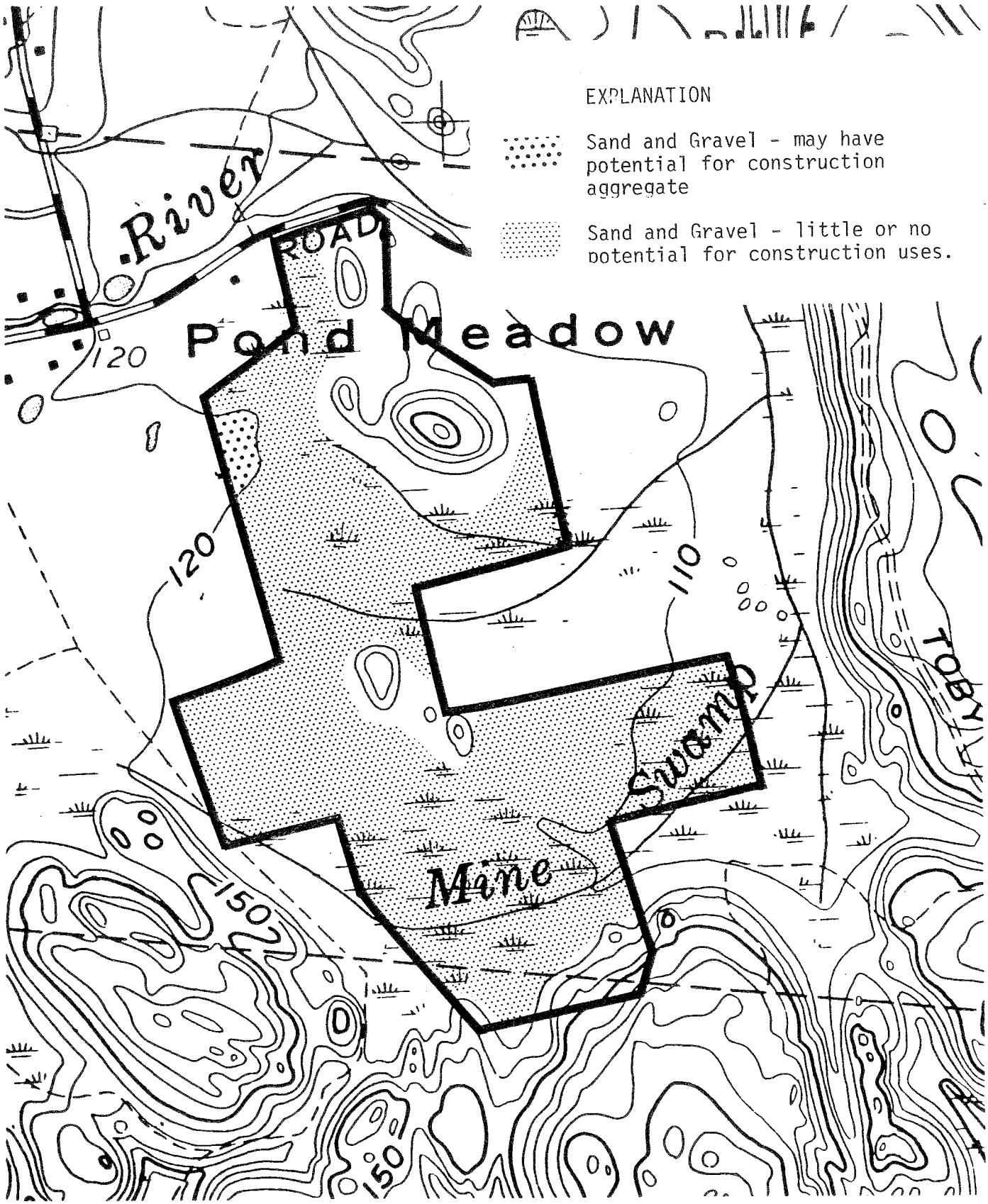
It should be pointed out that an aggregate survey of the Essex quadrangle was conducted by the Connecticut Department of Transportation (Soils and Foundations Division), (Source: Construction Aggregate Availability Study; Summary Report: Highway District II by Rino Vitali). Based on Vitali's map, it is indicated that approximately 2 acres in the western section of the site contain material which is 25 to 50 percent gravel size and which may potentially be available for granular aggregate. Assuming an average thickness of 10 feet, it is estimated that there would be potential for approximately 30,000 cubic yards of aggregate in this area. The survey further indicates the remaining sands and gravels on the subject parcel have little or no potential as an aggregate source. This study is a general construction aggregate survey of Highway District II for ConnDOT purposes. It may not contain the level of site detail necessary for evaluating specific resource development proposals.

Based on the site plan, sands and gravels throughout 75 percent of the site are covered by swamp sediments. These sediments consist of silt, sand, and clay mixed with organic matter in poorly drained areas.

Mine Swamp serves many valuable hydrologic as well as ecological functions, some of which include provisions for: 1) flood storage; 2) sediment control; 3) pollution control; and 4) habitat for waterfowl and wildlife.

Mine Swamp serves as a natural runoff retention basin, storing water during times of heavy rainfall, slowly releasing it to downstream areas. This results in lower stormwater peak flows downstream.

Aggregate Survey



The velocity of flood waters are slowed down in wetland areas, which reduces the chance of streambank erosion and allows the flood waters to precipitate out the sediment that they carry from upstream areas. Various types of wetland vegetation filter and hold sediment which would otherwise find its way to downstream ponds, lakes, and streams. Sedimentation can lead to rapid filling of surface water bodies, which in turn can lead to their destruction.

In addition, wetlands can change water quality through biochemical processes, often resulting in cleaner water. As a result, downstream water bodies (e.g., ponds, lakes, streams) are protected by wetlands from sediment, nutrients and other natural and man-made pollutants. It should be pointed out, however, that wetlands cannot remove all contaminants such as road salt and certain types of hydrocarbons which may find their way into the wetland.

Wetlands also provide valuable breeding, nesting, feeding and predator escape habitats for numerous types of waterfowl and mammals.

Some of the hydrological and ecological effects that may occur if the proposed mining operation is approved includes: 1) potentially increased sedimentation to downstream areas during periods of active mining, especially if proper sediment and erosion control measures are not taken; 2) reduction of the pollution filtering capabilities of the wetland area to be excavated which could lead to increases in sediment and nutrient loads downstream; and 3) during the periods of active mining will probably cause damage or destruction to wildlife habitats and wetland vegetation. Furthermore, the creation of a surface water body would render the water more susceptible to pollution. This, of course, will depend upon how the property will be used following the mining operation.

Because these soils are regulated inland-wetland soils, the applicant must secure all of the necessary permits from the Town before any mining operations begin.

Based on the site plan, it appears the proposed haul road will cross wetland areas within the parcel. Wetland crossings are generally feasible provided they are properly designed (e.g., culverts are properly sized and installed, permeable road base fill material is used). The roads should be constructed properly above the surface elevation of the wetlands. This will allow for better drainage of the roads and decrease the frost heaving potential of the road. It is recommended any road construction through wetland areas be done during the dry time of the year with adequate provisions for effective erosion and sediment control. Detailed plans for all proposed road crossings through wetlands should first be submitted to the proper Town authorities and commissions for their review, comment and final approval prior to beginning any construction.

HYDROLOGY

Approximately 85 percent of the site lies within the watershed of Mine Swamp Brook which traverses the southern limits of the property. Two tributaries of Mine Swamp Brook, in the north central portions, flows eastward towards the Brook. The watershed of Mine Swamp Brook may be defined as that land

Drainage Areas

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scale

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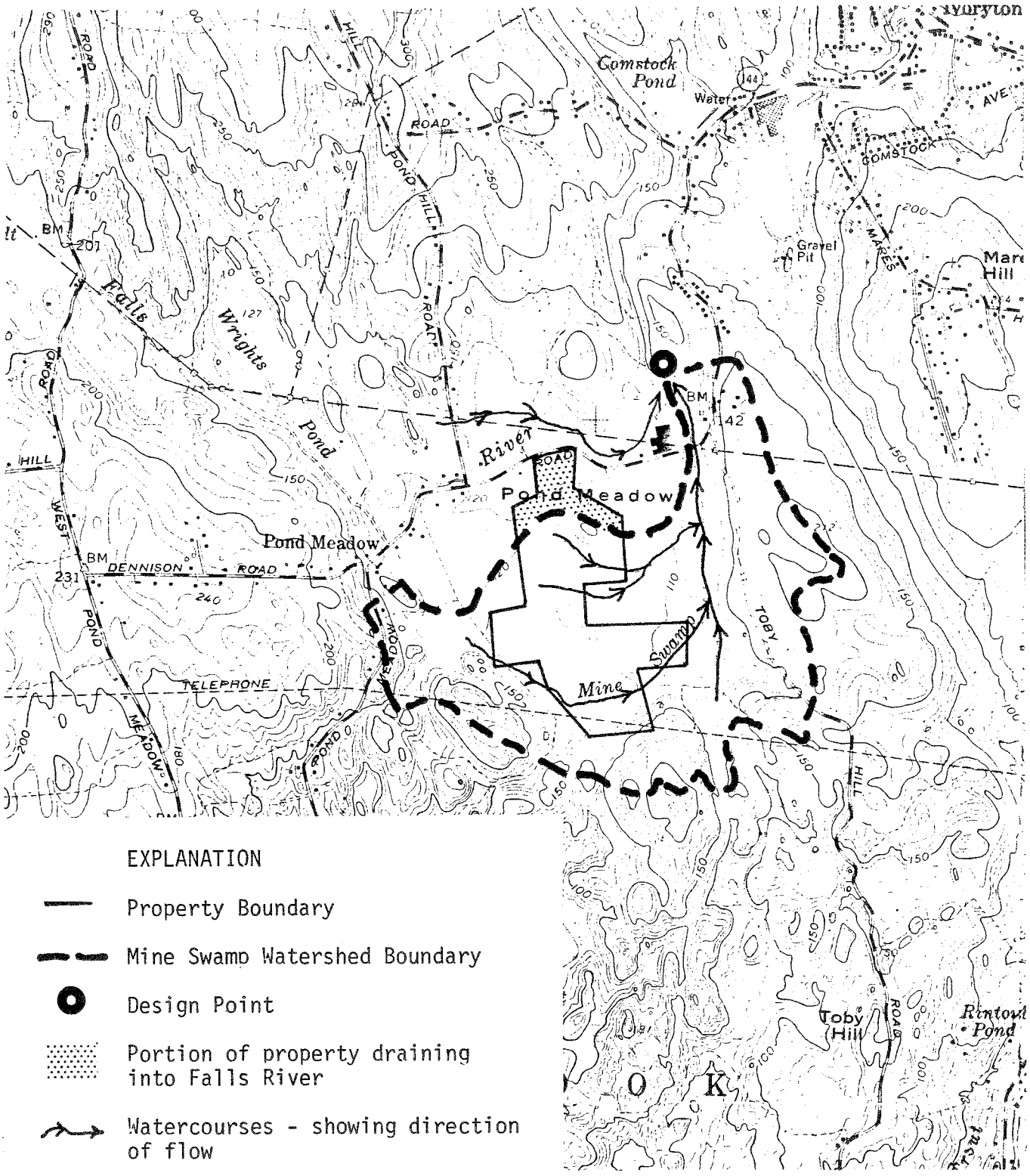


EXPLANATION

- Property Boundary
- Mine Swamp Watershed Boundary
- Design Point
- Portion of property draining into Falls River
- Watercourses - showing direction of flow

area from which ground or surface water may ultimately enter the Brook. The Mine Swamp Brook watershed is comprised of approximately 420 acres. A raindrop falling on the watershed boundary would have a 50 percent chance of passing into or out of the watershed. As shown by the Drainage Area Map, the watershed boundary tends to follow along the crests of local hills. It is to be expected that the true physical boundary may deviate to some extent from the boundary mapped. Small topographic elements such as bedrock exposures may serve as local control for water flow, causing a slight deviation of the true watershed boundary. Nevertheless, most variations will be minor and the watershed as depicted may be used as a reliable indicator for the general area of concern.

Rainfall in the form of surface runoff within the watershed may flow overland to Mine Swamp Brook or any of its tributaries or it may percolate downward through the soil until it reaches the ground water table. Once it reaches the ground water table, it moves slowly by the force of gravity towards a spring, wetland, or watercourse. The water may also be returned to the atmosphere through evaporation or transpiration. Mine Swamp Brook ultimately discharges into Falls River northeast of the site.

The northern limits of the property lies within the watershed of Falls River. Surface and ground water movement is generally north, towards the river. Water in this area is routed through culverts, passing under East Pond Meadow Road, ultimately discharging into Falls River.

According to the map Groundwater Availability in Connecticut by Daniel B. Meade the outwash deposits found within the site lies in an area which may be capable of yielding small to moderate amounts of water (1-100 gallons per minute) to individual wells. The potential of any particular location depends upon the texture and thickness of the deposits at that location, the proximity to streams and the size of those streams, watershed characteristics, and other hydrogeologic factors. In order to determine the sites water-supply potential, it will be necessary to conduct detailed testing, which should probably include the installation of a test well to obtain estimates of yields. As mentioned earlier, logs of test wells drilled on the site suggest that very fine to medium grained sands make up the bulk of the outwash deposits at depth. Fine grained sands are commonly a difficult material in which to finish wells and have a relatively slowly permeable medium. As a result, the fine grained materials may preclude the development of even a small to moderate yielding well or wells. Coarse grained stratified drift (sands and gravels), which are porous, permeable, and of sufficient thickness generally are the most productive aquifers in the state.

The Town expressed concern on the day of the field review in regard to the effects of the mining operation on the water quality of the potential aquifer (a geologic formation capable of producing usable amounts of water to a well). Of particular concern, is waste hydrocarbons associated with machinery/vehicles. Most types of hydrocarbon such as fuel oil, gasoline, diesal fuel, etc., can be a serious source of pollution to surface and/or ground water if proper precautions and care in operations are not taken. If they reach the groundwater, they may render the water unusable for potable purposes. According to the applicant, hydrocarbons (i.e., fuel oil, gas, etc.) will not be stored on the site; however, heavy equipment may be serviced (i.e., greased) on the property. Therefore, harmful effects on the aquifer

would be likely only if an accidental spillage of fuel oil from excavation machinery occurs. Every effort should be made to avoid storing hydrocarbons on the site and maintaining machinery on site. This should hopefully reduce the chance of hydrocarbon contaminants from reaching the ground water.

It is understood that the proposed mining operation would begin in northern parts of the site and terminate in the southern portions. The excavated material will be mined in a series of basins which will cover an area ranging in size from 2 to 5 acres. Each excavated area will be separated by an earthen dike. Once the material has been excavated, according to plan, which is expected to occur over a 20 year period, the dikes will be removed and a ±55 acre body of water created. Since the ground water table is at or near ground surface throughout most of the area to be excavated, it will be necessary to "dewater" the deposits in each of the mined areas. According to the project engineer, the water will be pumped from each basin to a sedimentation basin. Once the material is excavated, it will be piled on site until it is sufficiently dried out. The sand and gravel will then be trucked off of the property. If precautionary measures are not taken, there is a potential for siltation problems to occur down stream with implementation of the project. The presence of flat slopes throughout the excavated should help reduce erosion and sediment related problems. Nevertheless, it is recommended that a comprehensive erosion and sediment control plan be formulated and closely followed for the duration of the project.

If the proposed mining operation is approved and after mining has begun, the sand and gravel is found to be of unusable quality, consideration should be given to how the disturbed areas will be reclaimed. Disturbed areas should be revegetated in grasses as expeditiously as possible. In this regard, reclamation of mined areas should closely follow procedures discussed in the "Erosion and Sediment Handbook--Connecticut" (USDA-SCS, 1976). From an erosion/sediment control standpoint, mining operations would best be conducted during low flow periods (dry time of year).

As mentioned earlier, the proposed mining operation will require "dewatering." According to the project engineer, this will be accomplished by utilizing a pump. It was indicated that pumping rates would be about 100 gallons per minute, however, this rate could prove to be higher or lower. In this regard, it should be pointed out that most homes located on Green Meadow Drive, which lie between 800-1,000 feet west of the proposed project are served by dug wells. These wells tap the local water table. Because of the expected pumping, ground water flow in the areas of excavations may change direction in this part of the watershed. Instead of moving towards natural discharge points (i.e., streams and wetlands), ground water within the influence of the pump will probably flow towards the well in every direction. This creates an artificial discharge point, thereby lowering the water tables near the wells. This area of drawdown is called the "cone of depression." The pump used to dewater the excavated area will create a cone of depression. The size and shape of the "cone of depression" will vary depending on the duration and rate of pumping, the geologic characteristics of the aquifer, the natural slope of the water table, and the availability of recharge which may vary from season to season. It is recommended the applicant determine the cone of depression (area of influence) for the pump used for the dewatering process. Once this is accomplished, it will be possible to accurately determine whether or not dug wells on Green Meadow Drive will be affected during pumping

periods. Of special concern will be pumping which takes place during summer months when local water tables are already low. If pumping is conducted during droughty periods and if the "cone of depression" extends to Green Meadow Drive, there is a possibility that dug wells in this area could be adversely effected to a point where they become depleted and/or possibly dried up. The proposed pumping should not adversely effect the yeilds of nearby wells which tap the underlying bedrock.

It should be pointed out that the proposed mining operation may require a diversion permit from the Department of Environmental Protection's Water Resources Unit (Inland-Wetlands Section). Therefore, it is recommended that the Water Resources Unit be contacted before the project is approved.

SOILS

The accompanying soil survey map is taken from information provided in the Soil Survey Report of Middlesex County, Connecticut. The symbols on the map identify map units. Each map unit has a unique composition of soils. Areas with the same symbol have the same composition. The narrative describing each map unit is a revision of information contained in the soil survey report.

Each soil has been evaluated as a source for sand and gravel. The ratings are: probable source or improbable source. The intent of this rating is to show only the probability of finding material in suitable quantity. The suitability of the material for specific purposes has not been evaluated.

The ratings are based on the estimated percent by weight of soil material of various size classes less than three inches in diameter. These values were then used to identify the Unified Soil Classification. Using the guidelines in the USDA-SCS-National Soils Handbook, the Unified Classification was related to ratings for sand and gravel.

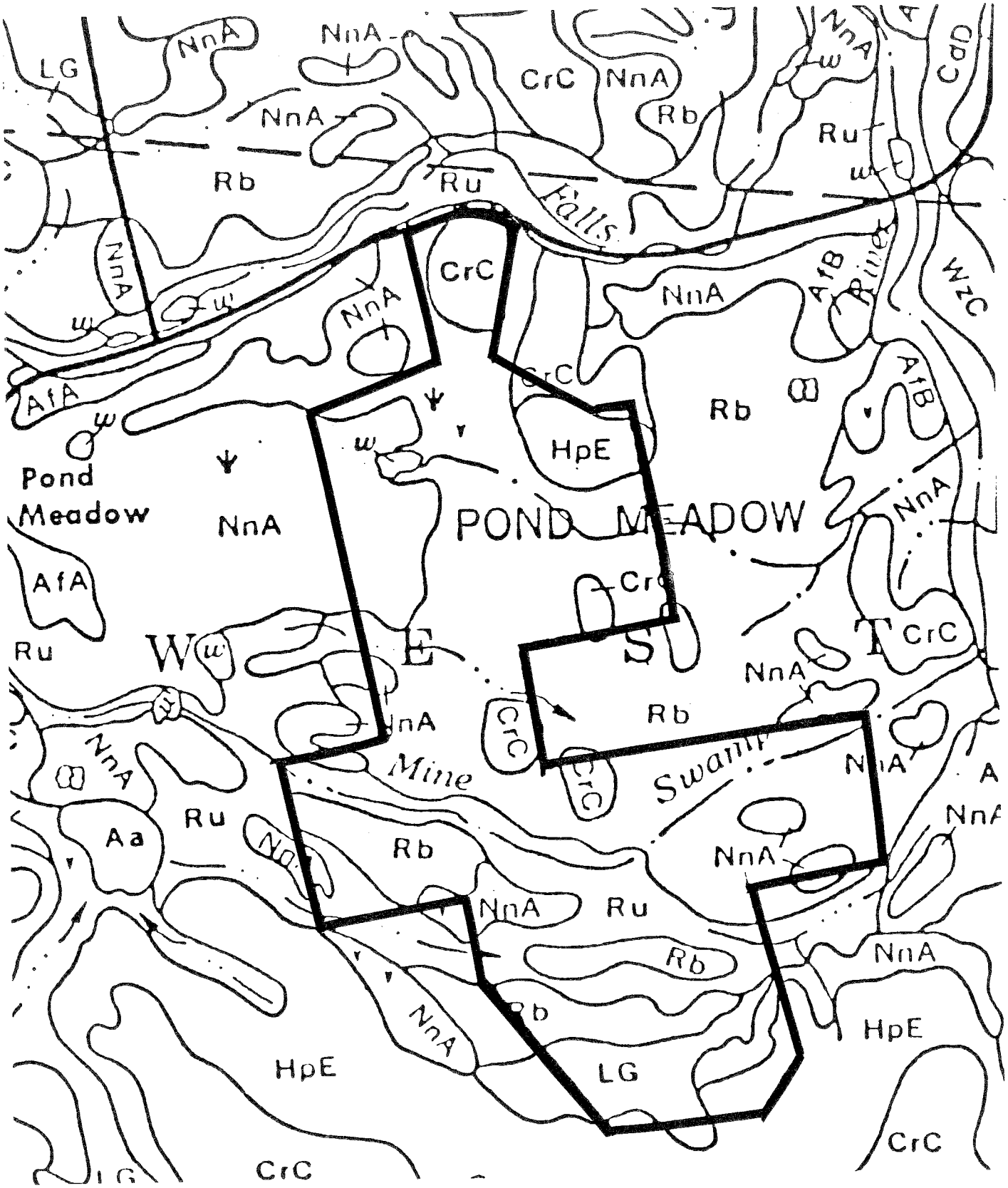
All values are based on observation made to a maximum depth of 60 inches. These sand and gravel ratings do not apply to depths greater than 5 feet.

Wetland Soils

The wetlands are on nearly level surfaces of 0 to 3 percent slopes. These soils have a seasonally high water table within 1.5 feet of the soil surface. In addition, water ponds on these soils during the wettest periods of the year. These soils are composed dominantly of mineral material, though it is not uncommon to find a 4 to 6 inch organic surface layer. There are some small areas where the organic surface layers may be up to 40 inches thick.

Map Units Rb and Ru. These map units are composed of Raypol and Rumney soils. These soils are very deep and poorly drained. Typically they have fine sandy loam and very fine sandy loam textures to a depth of 20 to 30 inches. This material is underlain primarily by fine sand and loamy fine sand to a depth of 60 inches or more. Ten to 25 percent gravel, dominantly 2 to 5 millimeters in diameter is present in this underlying material. These soils are an improbable source of gravel but a probable source of sand.

Soils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Map Unit Lg. This map unit is composed of Leicester soils. These soils are very deep and poorly drained. Typically they have fine sandy loam textures to a depth of 60 inches or more. Some fine gravel is present in the 20 to 60 inch soil depth. These soils are an improbable source of sand and gravel due to excess fines.

Upland Soils

Map Unit NnA. This map unit is dominated by Ninigret soils on 0 to 3 percent slopes. These soils are very deep and moderately well drained. They have a seasonally high water table between the depths of 1.5 to 3.0 feet. Typically, they have fine sandy loam textures to a depth of 18 to 30 inches. This material is underlain by sand and gravel to a depth of 60 inches or more. These soils are a probable source of sand and gravel.

Map Units CrC and HpE. These map units are composed of 2 kinds of soils that are so intermixed on the ground that they could not be separated on the map. One soil is named Charlton. This soil is very deep and well drained. Typically, it has fine sandy loam textures to a depth of 60 inches or more.

The other soil is named Hollis. This soil is shallow and excessively well drained. Typically, the Hollis soils are fine sandy loam and are 10 to 20 inches deep over hard bedrock.

The CrC map unit is dominated by the Charlton soil. This map unit is on 3 to 15 percent slopes.

The HpE map unit is dominated by the Hollis soil. This map unit is on 15 to 40 percent slopes.

The Charlton soils are an improbable source of sand and gravel because of excess fines. The Hollis soils are an improbable source of sand and gravel due to excess fines and their shallow depth.

Control of sediment and erosion in sand and gravel operations is critical and must be carefully integrated in the planned staging of a mining activity. The proposed Westbrook sand and gravel operation is extensive and could have a significant impact on nearby wetlands and watercourses if not executed in an orderly responsible fashion. A detailed sediment and erosion control plan should be prepared for the site which addresses control of sediment and erosion during the life of the pit and provides for adequate stabilization measures at the close-out of the operation.

The following are some suggested components of a sediment and erosion control plan. Most of this information is required by the provisions of Section 1109 "Excavation, Removal and Deposit of Soil and Other Materials" of the Westbrook Zoning Regulations (effective date 5-17-71). This list is not all-inclusive.

1. Existing topography at 10-foot or less contour intervals and proposed topography at the same scale showing final grades, drainage facilities, etc., after excavation.

2. A log of soil borings taken to the depth of the proposed excavation.

3. A schedule of major activities on the land, including the sequence and staging of land clearing operations, removal and stockpiling of topsoil, major earthmoving and grading operations and installation of conservation practices.

4. The location of overburden stockpiles and selected techniques for stabilization of these areas.

5. Construction details for sediment and erosion control facilities such as sediment basins, diversions and protected outfalls.

6. Access roads should have a construction entrance designed to minimize tracking of earth materials off site and to reduce dust.

7. Equipment storage and repair areas should be located more than 25 feet from a wetland or watercourse and a note forbidding the dumping of oil or other deleterious materials on the ground should be included in the plan.

8. No slope should be left with a grade steeper than 2:1 (50%).

9. All debris, stumps, boulders, etc. shall be removed from the site and disposed of in an approved location, or in the case of inorganic material, buried and covered with a minimum of two (2) feet of soil.

Following excavation and as soon as possible thereafter, ground levels and grades shall be established as shown on the completed topographical plan.

Retained subsoil and topsoil shall be respread over the disturbed area to a minimum depth of four (4) inches. This soil shall be treated with three (3) tons of lime per acre and 1,000 pounds of 10-10-10 fertilizer per acre and seeded with a grass or legume mixture prescribed by the Conservation District. Trees or shrubs of prescribed species will be planted in order to provide screening, natural beauty and to reduce erosion. The planted area shall be protected from erosion during the establishment period using good conservation practices.

Upon completion of the operation, the land shall be left so that natural storm drainage leaves the property at the original natural storm drainage points and so that the area of drainage to any one point is not increased.

Additional information is in the Connecticut Sediment and Erosion Control Handbook available at the Middlesex County Soil & Water Conservation District office in Haddam, Connecticut. District technical personnel are available to assist the developer directly in preparing a sediment and erosion control plan.

VEGETATION

The vegetation of the property is representative of the central hardwood zone that occurs in southern Connecticut. The woodland can be divided into five vegetation types. These include a mixed hardwood type, three hardwood swamp types, and an open area (field and power line right-of-way). Acreages were taken from an aerial photograph and therefore should only be used as an approximation.

Vegetation Type Description

Type A (Mixed Hardwood) This 18 acre, fully stocked stand is composed of medium quality sawtimber [trees 11.1" dbh (diameter at breast height) and larger] and poles (trees 6.1" to 11" dbh). Black oak, white oak, shagbark hickory, scarlet oak, tulip poplar, bigtooth aspen, red maple, black birch, red oak, yellow birch, American beech, and sassafras are the tree species present. The understory is composed of flowering dogwood, maple-leaf viburnum, partridgeberry, mountain laurel, and sweet pepperbush. The stand is located on an average site for growing hardwoods. The overstory trees in Type A are approaching maturity.

Type B (Hardwood swamp) This 5 acre, fully stocked stand is composed of medium and poor quality sawtimber and pole sized trees. Black gum and red maple are the predominant tree species present. Upland species such as American beech, white pine, white oak, red oak, hickory, tulip poplar, scarlet oak, and black birch are also present because of the coarse soils that allow good ground water movement. The understory is composed of club moss, sweet pepperbush, bull briars, highbush blueberry, and assorted fern species. The stand is located on an average site for growing hardwoods. The overstory trees in Type B are approaching maturity.

Type C (Hardwood swamp) This understocked stand (61 acres) consists of sawtimber and saplings (trees 1.1" to 6" dbh). The recent harvest has removed most of the overstory trees and nearly all of the merchantable sawtimber. The few remaining overstory trees are of poor quality. Red maple, black gum, and white oak are the tree species represented in the residual overstory. Tulip poplar, black birch, and red maple saplings occur in the understory. The stand is located on an average site for growing hardwoods. The overstory trees should be considered mature.

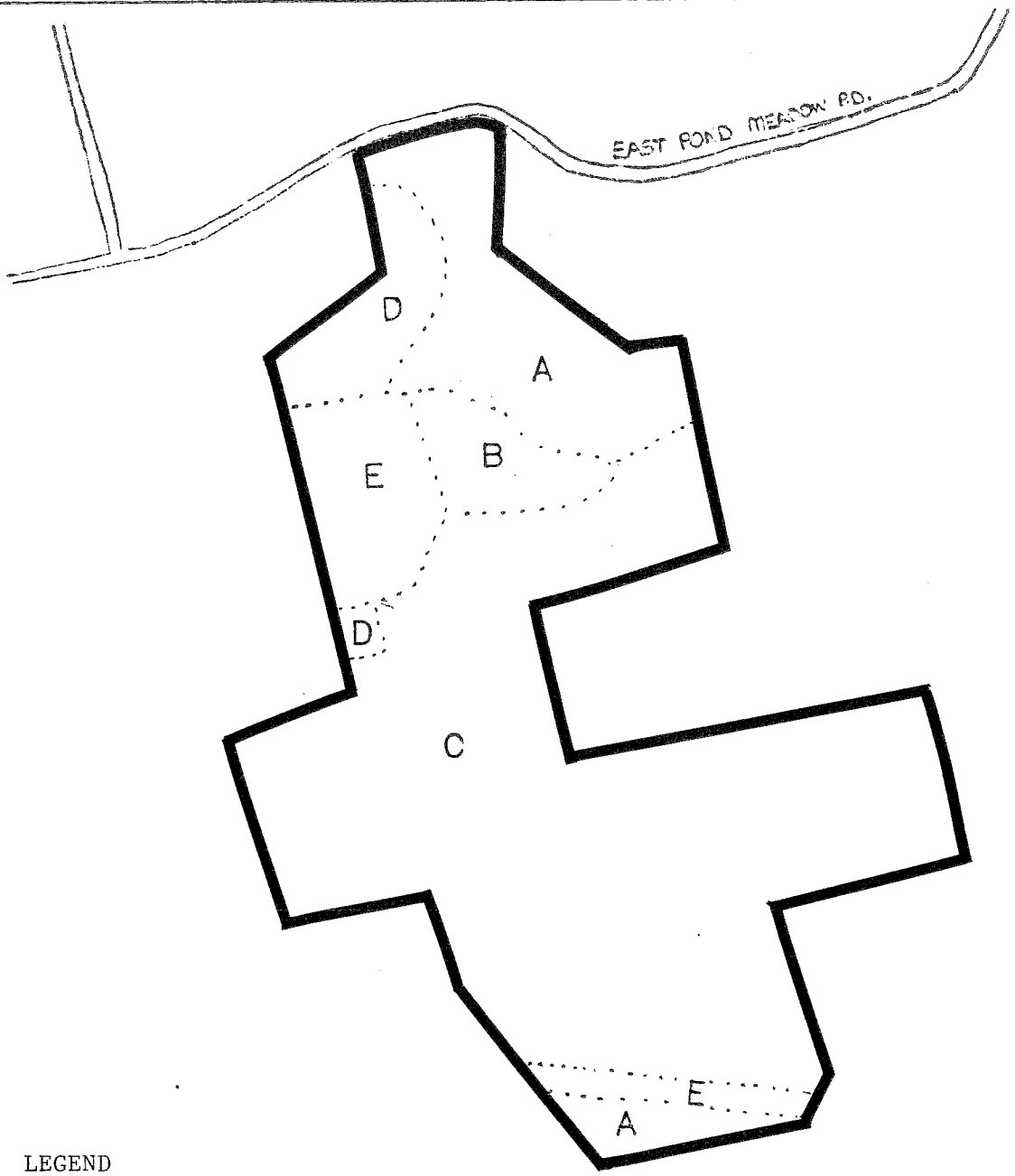
Type D (Hardwood swamp) This 7 acre pole stand is composed of red maple and black gum. The lesser vegetation includes sweet pepperbush, and highbush blueberry; the stand is fully stocked and immature. It is located on an average site from growing quality hardwoods.

Type E (Open area) 7 acres.

Aesthetic Considerations

This forested tract offers some of the amenities that are associated with rural areas. The size of the proposed excavation (55 acres) will allow the possibility of leaving much of the remaining forest intact. The proposed buffer along the property boundary should be left in its forested state in order to reduce the visual impact and noise to neighboring homeowners.

Vegetation



LEGEND

═══	Road
- - -	Vegetation type boundary
▬▬	Property boundary

VEGATATION TYPE DESCRIPTION

Type A	Mixed hardwood, fully stocked, pole and sawtimber	18 acres
Type B	Hardwood swamp, fully stocked, pole and sawtimber	5 acres
Type C	Hardwood swamp, understocked, sapling and sawtimber	61 acres
Type D	Hardwood swamp, fully stocked, pole size	7 acres
Type E	Open area	7 acres

The off road location will make the effect of the proposed operation less visible. Most of the proposed operation will occur in Type C. Presently, vegetation Type C has the least aesthetic appeal of all the vegetation types due to the heavy harvest and subsequent dense shrub understory.

Large, healthy trees are usually considered aesthetically pleasing. The retention of these trees are important to the aesthetics of the area. Red oak, white oak, and American beech are usually considered aesthetically pleasing because of their potential to reach large sizes. American beech and yellow birch are favored for their attractive bark. A good portion of the dominant trees on the property should be able to grow to 20" to 24" dbh.

Flowering dogwood and mountain laurel are the major flowering shrubs. These species should be retained for their aesthetic value. Where these species are present, some of the overtopping trees should be removed to allow more sunlight to reach the understory. This will stimulate the flowering of these shrubs.

Limiting Conditions/Potential Hazards

The overall condition of the trees on this property is acceptable. There are only a few trees that show signs of advanced decay or other signs of potential hazard.

Construction activities should be planned and conducted to minimize the disturbances in sections of the forest that are to be saved. Road building, excavation, and soil compaction (from heavy machine use) may adversely affect the moisture and aeration balance within the soil. This could lead to the decline in tree health and vigor and may eventually lead to the death of the tree within three to five years. Physical damage to the root system and trunk of the tree by machinery may also result in the decline of individual trees.

Vegetation Type A is particularly susceptible to infestation by the gypsy moth because of its large component of oak. Favoring trees that the gypsy moth does not feed upon would make the area less susceptible to defoliation. Black birch, hickory, red maple, and tulip poplar are some of the species that are not readily defoliated.

Windthrow is a potential hazard in parts of vegetation Type B, C and D where the water table is close to the surface. Tree root depth is restricted by saturated soils. Saturated soils are more pliable than dry soils. Shallow root systems and saturated soils make wetlands very susceptible to windthrow. Some windthrow may occur where the edge of the excavation is in the wetlands.

Construction activities within wetlands which impede the natural drainage and raise the water table may have adverse effects of the forest vegetation. Trees will decline in health and may eventually die if the water table is raised substantially. Adequately sized and placed culverts should be installed when access roads cross any drainage.

Conversely, lowering the water table substantially could effect the health of shallow rooted trees and lesser vegetation due to increased moisture stress. A long duration of a lower water table may be responsible for a change of

vegetation type. Species that are able to seed in drier environments may eventually replace the present stand.

Management Considerations

The maintenance of healthy and vigorous trees should be a major concern in any vegetation management on the property; unhealthy trees are more susceptible to insects and disease problems.

None of the vegetation types are experiencing any excessive crowding at this time. The young sapling stand in vegetation Type C would benefit if all the overstory trees are killed soon (the value of the overstory trees would not be worth the cost of harvesting them). The majority of the more desirable yellow poplar saplings will be stunted and may succumb if they do not grow in full sunlight. The stand will most likely be dominated by low value black birch and red maple if the overstory trees shade out the yellow poplar. Federal costsharing funds may be available to partially pay for the work.

Management in the near future should include a fuelwood thinning in vegetation Type A and a sawtimber thinning in vegetation Type B. The thinnings should concentrate on removing a good portion of the understory trees and up to a third of the overstory trees. Ideally, forty of the healthiest overstory trees per acre should be retained as crop trees.

WILDLIFE

The excavation of 55 acres of the ±95 acre site will probably result in 55 acres of land unsuitable for wildlife habitat. The degree to which the remaining 43 acres will be impacted is questionable due to several factors:

1. What cover types or habitat types are present on the remaining 43 acres?

2. What type of habitat or cover type adjoins or forms the neighboring habitats to the 43 acres?

3. How much mechanical/human disturbance will be caused by the on-going excavation process?

Without evaluation of these factors, the impact to the remaining 43 acres cannot be fully measured. Additional assistance is available from DEP Eastern District Headquarters Field Biologists at 295-9523.

PLANNING CONCERNS

The zoning for this site is two acre Rural Residential. Section 1109 of the Zoning Regulations requires a special exception from the Zoning Commission for a gravel extraction operation. These special exception provisions

allow the Zoning Commission to minimize the impact of a gravel operation through the use of such requirements as buffer strips, fencing and limitation of the hours of operation.

The Westbrook Master Plan includes the recommendation that easterly and southerly parts of this site be preserved as open space. The Master Plan recommends that the remaining part of the site be used for two acre residential development.

The existing land use in this area is low density residential. There are potential incompatibilities in the area such as groundwater, noise and traffic. The pumping of water that will be necessary during gravel mining could cause problems with both dug and drilled wells in the area. The location of wells in the area should be determined and the potential impact of the gravel operation on these wells should be analyzed.

Truck Traffic

The developer is proposing to remove approximately 1,700,000 cubic yards of material. It is estimated that it will take 28 years to complete this operation with 20 trucks per working day. The applicant also estimates that 75% of these trucks will be going to their processing facility in Deep River and that the remaining 25% will be going in other directions that will be determined by the location of customer purchases. It should be emphasized that these are estimates that could change greatly depending on future events. If a special exception is granted, the Zoning Commission may want to consider adding conditions that will control the hours of operation, number of trucks per day, noise levels and truck routes to be followed.

The 20 trucks per day means 40 one way trips per day through towns in the Region. The trucks would be vehicles with about 15 cubic yard capacity. These large vehicles would have a significant impact on the neighborhoods that they travel through during the nearly 30 year projected excavation period.

The design standards for many of these local roads are not high. They often have narrow travel lands, sharp curves, poor sight distances, inadequate road shoulders and poor pavement conditions.

Truck Routes

Assuming that most of the truck traffic from this site would go to the Connecticut Sand and Gravel facility in Deep River, an outline of the characteristics of each route to this facility is shown in Table I.

The Ivoryton route would follow East Pond Meadow Road, Main Street, Route 602 and Route 80. The Route 145 alternative would use East Pond Meadow Road, Dennison Road, West Pond Meadow Road, Cross Road, Route 145 and Route 80.

The Ivoryton and Route 145 alternatives are noted first because they have the shortest distance (two miles) to a state highway. The use of Route 145, however, would make the trip to the Deep River facility 1.6 miles longer overall. Neither route has good road conditions. The Ivoryton Route has somewhat wider road pavement but has the disadvantage of poor overall road

TABLE I

	Ivoryton Alternative	Route 145 Alternative	Winthrop Road Alternative	Lynn Road Alternative
Distance to a State highway	2.0 miles to Route 602	2.0 miles to Route 145	3.8 miles to Route 80	2.9 miles to Route 80
Distance to facility in Deep River	4.6 miles	6.2 miles	5.1 miles	4.2 miles
Pavement Width between site and State highway	Approximately 22-26 feet	Approximately 20-22 feet	Approximately 20-22 feet	Approximately 16-18 fe
Alignment of roads between site and state highway	Poor horizontal and vertical alignment for the major part.	Poor horizontal and vertical alignment at certain points but the major part has good alignment.	Poor horizontal and vertical alignment at certain points.	Poor horizontal and vertical alignment for most of Lynn Road.
Approximate number of housing units between site and State highway	60	45	96	58
Approximate number of businesses and institutional uses between site and State highway	13	0	0	0
Approximate number housing units along entire Route	141	101	118	80
Approximate number of businesses and institutional uses along entire Route	14	5	1	1

alignment. The Route 145 alternative has better overall road alignment but has the disadvantage of narrower road pavement.

The number of residential, business and institutional uses that would be affected on the two mile distance to a state highway would be 62% greater for the Ivoryton alternative as compared to the Route 145 alternative. This would involve 73 affected uses for the Ivoryton alternative and 45 affected usus for the Route 145 alternative.

Another disadvantage of the Ivoryton route is the major traffic generators that are located along this route. Pratt-Read Corp. and Turbo Products have between them about 300 employees and get about 14 delivery trucks per day. The business district in Ivoryton also generates significant amounts of traffic.

The Winthrop Road route would use East Pond Meadow Road, Dennison Road, West Pond Meadow Road, Winthrop Road and Route 80. This route runs somewhat parallel to the Route 145 alternative but it is about a mile shorter in total distance to the Deep River facility. A disadvantage of using this route is that the distance on local roads before reaching a state highway is nearly twice that of either the Ivoryton or Route 145 alternatives. Because of this, the number of uses on local roads that would be affected by the truck traffic is more than double that of the Route 145 alternative and more than one third greater than that of the Ivoryton alternative. Another disadvantage of this route is the alignment problems that are encountered on Winthrop Road as compared to the good alignment and wider pavement found on nearby Route 145.

The Lynn Road route would involve the use of Lynn Road, Bushy Hill Road, Winthrop Road and Route 80. The main limiting factor of this route is the poor condition of Lynn Road. The narrow pavement width and very poor road alignment make this road inadequate for the use of heavy trucks.

Sight Distance

The traffic report submitted with this application shows sight distances at the intersection of the proposed haul road and East Pond Meadow Road. This report indicates a sight distance in an easterly direction of 300 feet and a sight distance in a westerly direction of 392 feet. A pacing of these sight distances verified the easterly sight distance of 300 feet but seemed to indicate that the westerly sight distance is substantially shorter than the 392 feet indicated in the traffic report. It is suggested that the Town investigate these sight distances further through the use of its own engineer. The Connecticut River Estuary Regional Planning Agencies Model Road Standards recommend a minimum sight distance of 350 feet. Because of the heavy truck traffic, it is especially important that adequate sight distances exist for this proposed road. The sight distance in an easterly direction should be improved by removing some vegetation on the northerly side of the road as is suggested in the traffic report. If investigation of the westerly sight distance indicates that it is not at least 350 feet, then measures should be taken to improve this distance.

About the Team

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a variety of federal, state, and regional agencies. Specialists on the Team include geologists, biologists, foresters, climatologists, soil scientists, landscape architects, archeologists, recreation specialists, engineers and planners. The ERT operates with state funding under the supervision of the Eastern Connecticut Resource Conservation and Development (RC&D) Area.

The Team is 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 activitis. To date, the ERT has been involved in reviewing a wide range of projects including subdivisions, sanitary landfills, commercial and industrial developments, sand and gravel operations, 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 officials 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. This request letter should include a summary of the proposed project, a location map of the project site, written permission from the landowner allowing the Team to enter the property for purposes of review, and a statement identifying the specific areas of concern the Team should address. When this request is approved by the local Soil and Water Conservation District and the Eastern Connecticut RC&D Executive Council, the Team will undertake the review on a priority basis.

For additional information regarding the Environmental Review Team, please contact Jeanne Shelburn (774-1253), Environmental Review Team Coordinator, Eastern Connecticut RC&D Area, P.O. Box 198, Brooklyn, Connecticut 06234.