environmental review team report

SHEPARD HILL

PLAINFIELD, CONNECTICUT

RC&D

EASTERN CONNECTICUT
RESOURCE CONSERVATION AND DEVELOPMENT PROJECT

ASSISTED BY: U.S. DEPARTMENT OF AGRICULTURE,
SOIL CONSERVATION SERVICE AND COOPERATING AGENCIES

ENVIRONMENTAL REVIEW TEAM REPORT
ON
SHEPARD HILL INDUSTRIAL PARK
PLAINFIELD, CONNECTICUT
JULY, 1975

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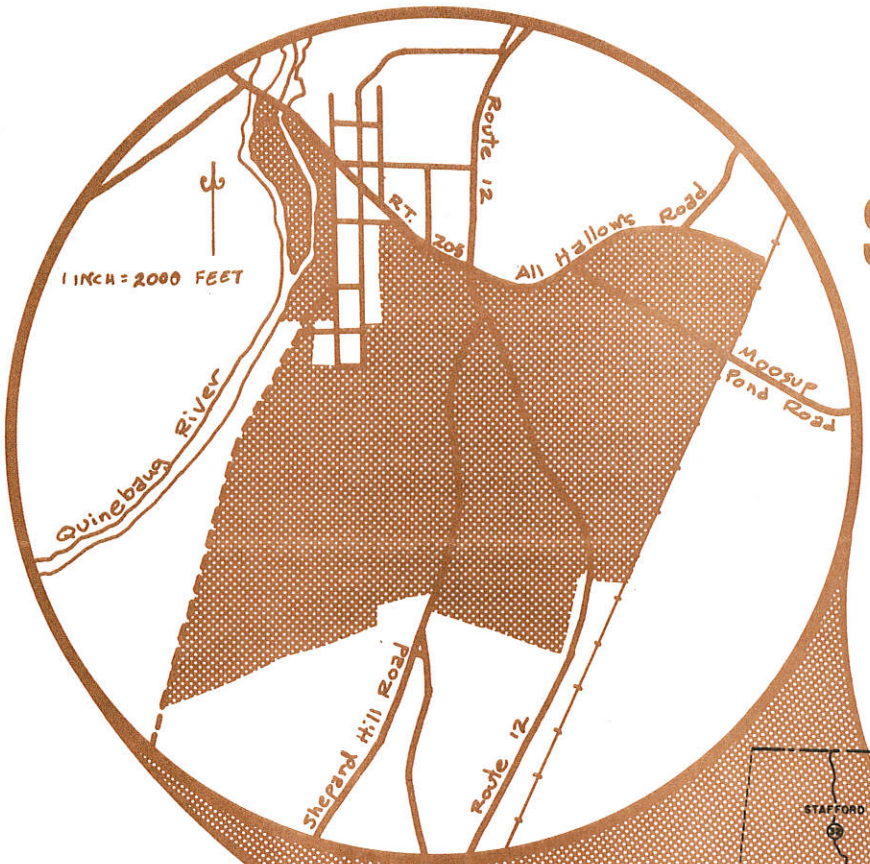
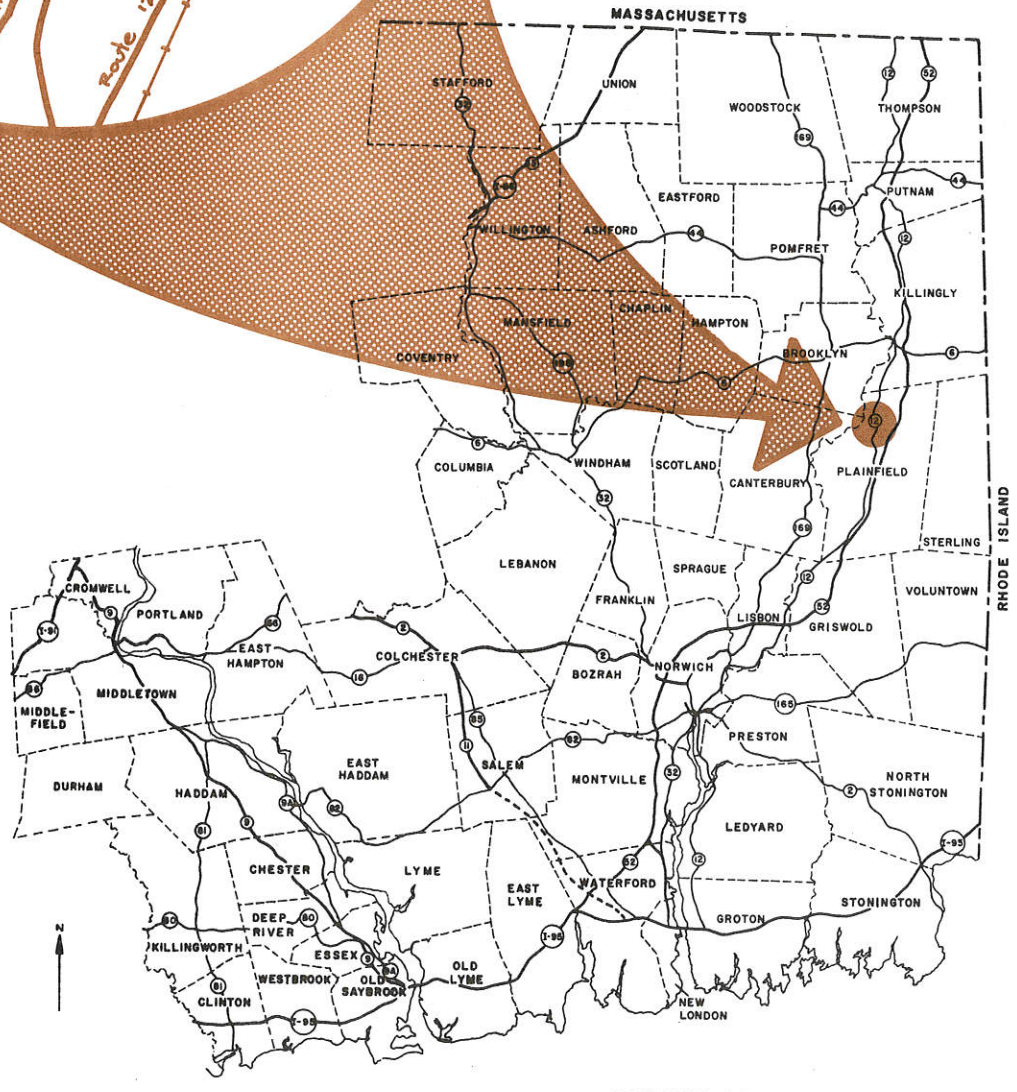
EASTERN CONNECTICUT RESOURCE CONSERVATION
AND DEVELOPMENT PROJECT
Environmental Review Team
139 Boswell Avenue
Norwich, Connecticut 06360

LOCATION OF STUDY SITE



SHEPARD HILL
Plainfield, Connecticut



EASTERN CONNECTICUT
RESOURCE CONSERVATION AND DEVELOPMENT PROJECT

ENVIRONMENTAL REVIEW TEAM REPORT
ON
SHEPARD HILL INDUSTRIAL PARK
PLAINFIELD, CONNECTICUT

This report is an outgrowth of a request from the Plainfield Economic Development Commission, with the approval of the landowners, to the Windham County Soil and Water Conservation District (S&WCD). The S&WCD referred this request to the Eastern Connecticut Resource Conservation and Development (RC&D) Project Executive Council for their consideration and approval as a project measure. The request has been approved and the measure reviewed by the Environmental Review Team.

The soils of the site were mapped by a soil scientist of the USDA Soil Conservation Service. Reproductions of the soil survey and a table of limitations for urban development were forwarded to all members of the Team prior to their review of the site.

The Team that reviewed the proposed subdivision consisted of the following personnel: Albion Weeks, District Conservationist, Soil Conservation Service (SCS); Dean Rector, Soil Scientist, SCS; Edwin Minnick, Civil Engineer, SCS; Richard Hyde, Geologist, Natural Resource Center, Connecticut Department of Environmental Protection (DEP); Joseph Piza, Fisheries Biologist, DEP; George Cloutier, Forester, DEP; Malcolm Shute, Sanitarian, Connecticut Department of Health; David R. Miller, Climatologist, Connecticut Cooperative Extension Service (EXT); Daniel L. Civco, Landscape Architecture, EXT; Barbara A. Hermann, Team Coordinator, Eastern Connecticut RC&D Project.

The Team met and reviewed the site on May 8, 1975. Reports from each Team member were sent to the Team Coordinator for review and summarization.

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 potential developers and the Town of Plainfield. 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 Council hopes you will find this report of value and assistance in making your decisions on this particular site.

If you require any additional information, please contact: Miss Barbara A. Hermann (889-2324), Environmental Review Team Coordinator, Eastern Connecticut RC&D Project, 139 Boswell Avenue, Norwich, Connecticut 06360.

INTRODUCTION

The Plainfield Economic Development Commission has submitted an application to the Connecticut Department of Commerce for a planning grant for an industrial park. The site under consideration is located on the north slope of Shepard Hill near the village of Wauregan.

Under immediate consideration is an area of around 120 acres, located south of Route 205 and west of Route 12. There is an additional 150 acres which are being considered for future potential industrial expansion. This includes land south of the proposed site and north of Moosup Pond Road. About 60 acres of land between Shepard Hill Road and Moosup Pond Road are already developed industrially by the Novelty Textile Company and American Standard Corporation. (see Topography map on page 7 for locations of proposed and existing development).

Public water and sewer are now available at the edge of the site. Access to I-84, if and when it is completed, will be less than a mile from the site. The Connecticut Turnpike is about two miles away.

This report will describe the natural resources of this site and evaluate the site with respect to the various aspects of industrial development and identify areas with potential problems or opportunities. Comments or recommendations made within the report are presented for consideration by the town and potential developers in the preparation and review of the development plans, and should not be construed as mandatory or regulatory in nature.

EVALUATION

EXISTING RESOURCES

Topography and Site Description. The site is located in northwestern Plainfield on the north-facing slope of Shepard Hill. This 160 foot hill forms roughly an ellipse with its long axis running north-south. Its elevation at the base is 180 feet above sea level and at the peak the elevation is 340 feet above sea level. The land slope of the proposed site is rather steep along the hill margins (10% to 13%) but becomes more gentle at the peak and along the main axis (3% to 7%) of the hill. A topography map is shown on the opposite page.

In terms of land form, the hill's base is at the 180 foot elevation, marking the beginning of the Quinebaug floodplain to the west and the lowland areas to the east. The 180 foot elevation also generally marks a distinct change in earth materials from "till" on Shepard Hill to stratified sand and gravel deposits in the valley. The property boundary along the western edge is also coincident with the 180 foot surface elevation.

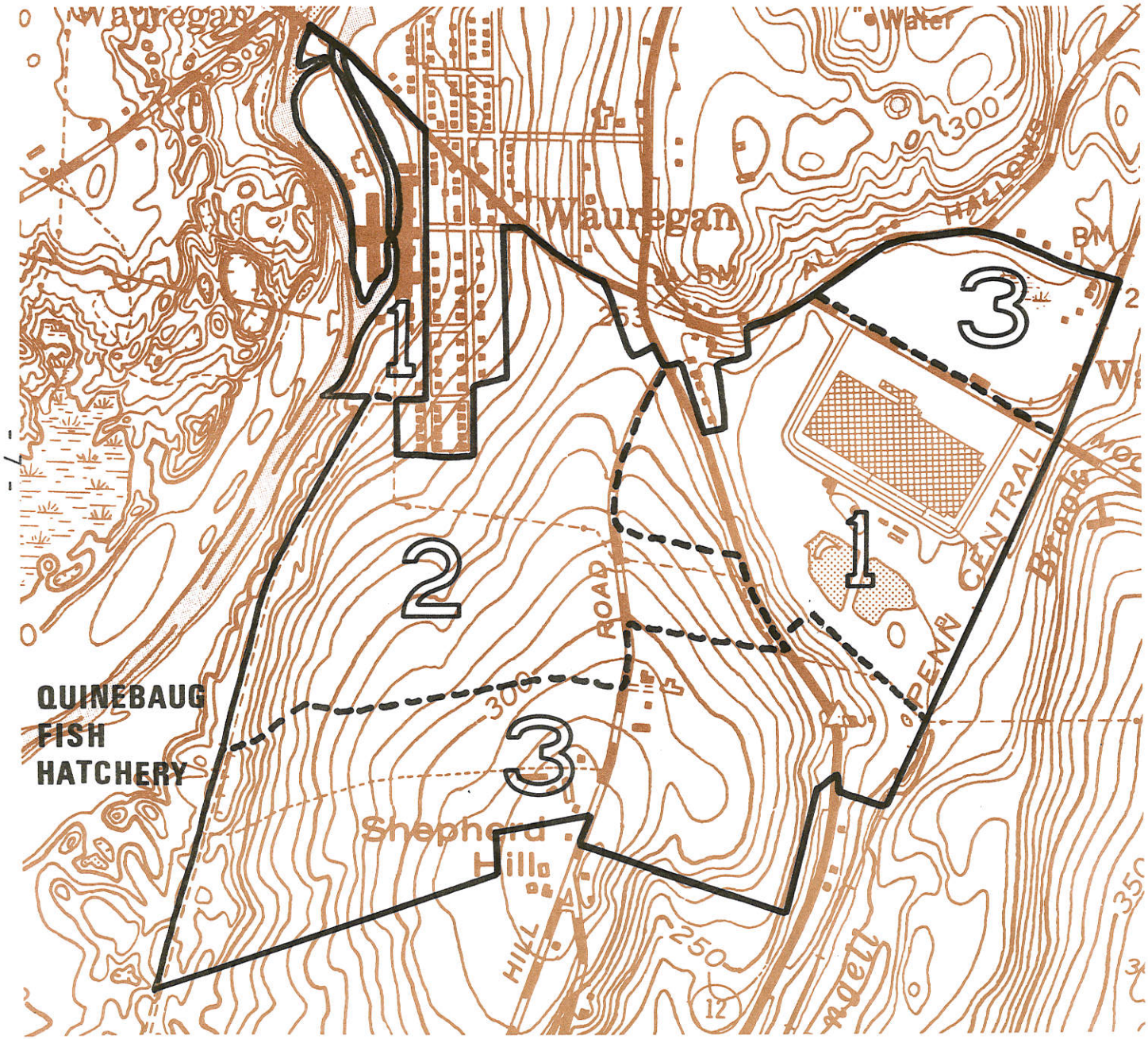
Shepard Hill is cored by bedrock but the depth to rock varies from place to place as a result of glacial action in the past. Huge amounts of rock and rubble were piled up against existing rock ridges and remained after the glacial ice melted away. This is the typical situation for many of the till hills (drumlins) of eastern Connecticut. Characteristically they are steep sloped and exhibit bare rock along the southern and southeastern sides while overburden is thicker and the slopes are more gentle along the northern and northwestern margins. Because the industrial site would be located on the northern section of Shepard Hill, the thickness of till materials probably is greater than 10 feet but less than 30 feet with the average being closer to 15 feet to 20 feet. (See page 8 for a map showing rock outcrops and areas less than 10 feet to bedrock.)

Other than this portion of Shepard Hill being reviewed, there is the 21.7 acre parcel north of American Standard. This property falls within the valley stratified drift region.

Surficial Geology. As it was stated earlier, Shepard Hill is covered by till, which is the geologist's term for "hardpan" or "boulder clay". All of these terms refer to the most widespread surficial material (unconsolidated overburden) found in Connecticut. Till consists of those materials trapped and carried within or on the active glacial ice, but remained in mass after the ice had melted. It was relatively unaffected by water transport. More specifically, till is defined as a heterogeneous material composed of various mixtures of boulders, gravel, sand, silt, and clay particles, none of which are significantly sorted or stratified according to grain size, as in the case of waterlain deposits.

The 21.7 acre parcel north of American Standard on Moosup Pond Road is a flat, lowlying piece underlain by stratified drift. The water table is close to the land surface at this location and the predominant underlying materials are sands and gravels. Based on test hole logs published in the Quinebaug River Basin Hydrogeologic Report, Connecticut Water Resources Bulletin #9, these materials extend down approximately 45 feet before hitting the bedrock surface. The materials are stratified or layered according to grain size with the finer grained layers located along the valley walls, All Hollows Road, and Wauregan Station. These deposits are generally clay, silt and fine sands. Moving toward the middle of the

TOPOGRAPHY



1 Developed Industrial Area

2 Proposed Industrial Park

3 Potential Industrial Expansion

Site Boundary

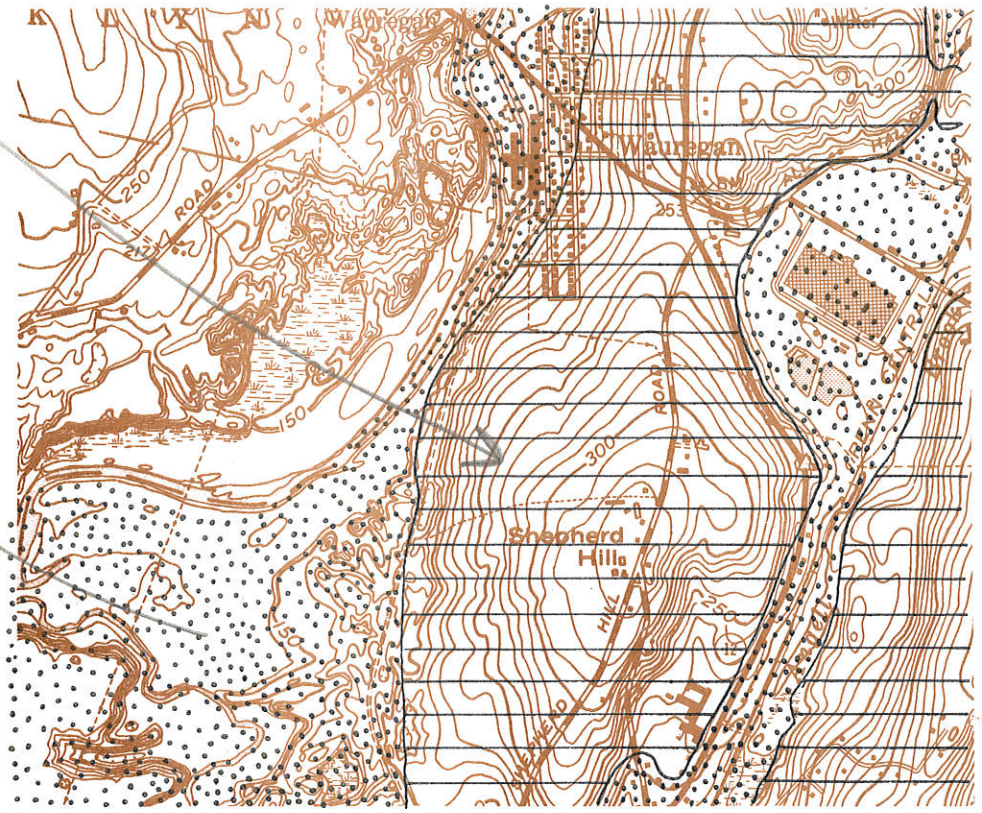
1 INCH=1000 FEET

N

SURFICIAL GEOLOGY

TILL

STRATIFIED DRIFT



1 INCH = 2000 FEET N

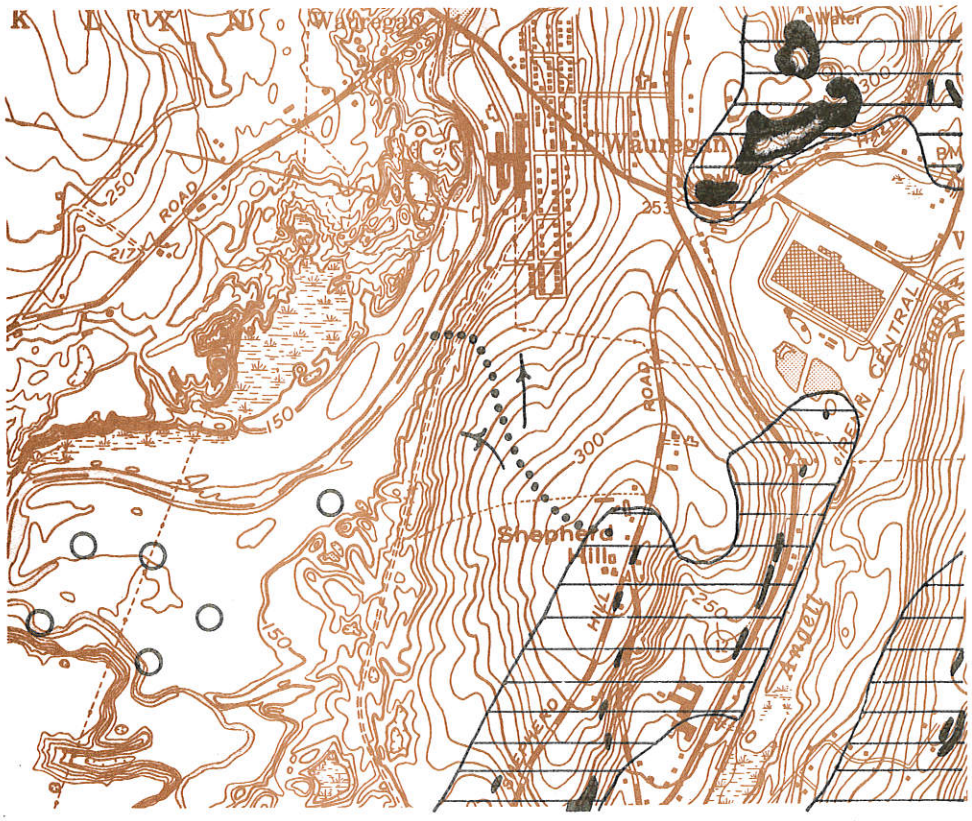
OTHER PHYSICAL FEATURES

LESS THAN 10 FEET TO BEDROCK

BEDROCK OUTCROPPINGS

DRAINAGE DIVIDE

FISH HATCHERY ACTIVE WELLS



1 INCH = 2000 FEET N

valley, the center of the field presently in active agriculture, the deposits become much more coarse-grained; a 20 foot gravel layer with sand below is generally the case.

Moving to the west of Shepard Hill the deposits are also of the stratified drift type as would be expected in a major drainage system like the Quinebaug River. It is here, adjacent to the proposed industrial park, the State Fish Hatchery is located and these stratified drift deposits are the hatchery's only source of water. The deposits are stratified and generally fairly coarse grained. For this reason ground water travels rapidly to any point where it is being withdrawn from a well.

Bedrock Geology. The underlying bedrock, as mapped from the surrounding rock outcroppings, falls within the lower member of the Quinebaug Formation. These rocks are gneisses consisting of well layered rocks of fine grained primary mineral groupings of epidote-biotite-quartz-andesine, with various combinations of hornblende and microcline. A gneiss is a coarse-grained metamorphic rock, as compared to a schist, in which fairly wide bands, sometimes several feet in thickness, rich in granular minerals alternate with narrow bands, usually only inches thick, which are rich in flat, elongate and platty minerals.

Soils. A detailed soils map of the site is given in the Appendix to this report along with a soils limitations chart. Due to the original scale at which the soils are mapped (1"=1,320') the lines shown on the soils map should not be viewed as precise boundaries, but rather as guidelines to the distribution of soil types on the property. The soils limitations chart indicates the probable limitations for each of the soils for basements, landscaping, and streets and parking. However, limitations, even though severe, do not always preclude the use of the land for development. If economics permit greater expenditures for land development and the intended use is consistent with the objectives of local and regional development, many soils and sites with difficult problems can be used.

The soils limitations chart has been broken down into two separate charts, one for the proposed industrial park and one for the areas of potential industrial expansion. In the proposed industrial park, the soils fall primarily within natural soil group C, upland soils over compact glacial till (hardpan). These soils are typically found on the tops and slopes of drumlins, as is the case here. The soils are underlain by a hardpan at 16 to 36 inches below the surface which drastically reduces percolation rates. During wet seasons, excess water in the soil moves downslope above the hardpan.

Soil 35C (Paxton series) is a well drained soil above the hardpan. It has excess water above the hardpan for only short periods during early spring or after heavy rains. Soils 31A, 31B, and 31C (Woodbridge series) are moderately well drained soils above the hardpan. During the period of highest saturation, usually in early spring, the water table remains within 15 to 20 inches of the soil surface. This condition seldom persists beyond late spring. Soil 98 (Ridgebury series) is a poorly drained soil with a high water table that remains within 6 inches of the soil surface during the wettest part of the year. The high water table often persists into late spring and may recur after prolonged or heavy summer rains. This is an inland wetland soil. The remaining soil on the site is 213C (Enfield series), an excessively drained soil overlying water-deposited beds of sand and gravel.

This soil is found on the western border of the site and corresponds with the stratified drift deposits shown on the surficial geology map. Permeability is rapid and the soil has a low water holding capacity and low natural fertility.

In the areas proposed for potential industrial expansion, the one south of the proposed industrial park is very similar in terms of the composition of soils present on the site. The area north of Moosup Pond Road, however, differs considerably. It is located entirely in an area of stratified drift along Angell Brook. Soil 60A (Hinckley series) is an excessively drained soil. Soil 455A (Sudbury series) has a high water table during wet seasons that remains within 15 to 20 inches of the soil surface. Soil 466 (Walpole series) is poorly drained with a hgh seasonal water table that remains within 6 inches of the surface during the wettest part of the year. This would be classified as an inland wetland soil.

Fisheries. As mentioned before, the Quinebaug Trout Hatchery, owned and operated by the State, is located adjacent to the western boundary of the proposed industrial park. The map on page 8 shows the location of the six wells which are currently being used to provide water for the hatchery. The Quinebaug River by itself is a valuable resource and warrants serious consideration when development occurs on adjacent lands. With the hatchery present, even greater concern exists, particularly with respect to surface and subsurface runoff.

Forestry. There are no forest lands directly involved on the proposed development site. However, several thousand acres of White Pine occupy the adjacent river valley and upland terraces. White Pine is one of our most valuable forest species and grows in quantity on only a very small percentage of Connecticut's soil types. It is our most productive species in terms of timber products and also is one of the most aesthetically pleasing types. Most of the State's intensive forest recreation activities are centered around this species.

WATER SUPPLY

A public water supply is apparently available at the site and of sufficient quantity to service the proposed industrial park. All proposals for additional water use, such as service to individual industries, must be approved by the Public Water Supply Section of the State Department of Health. Such approval should be obtained prior to any site work.

It is also recommended that high water use industries planning to settle in this park should contact the water supply company prior to making any commitment. The water company in turn should keep abreast of the park's development to insure adequate future supply is available for expansion.

On-site water supplies may be an alternative to those high water use industries for supplementing the municipal water supply. However, consideration should be given to the additional strain this may impose upon the municipal sewer system.

WASTE DISPOSAL

Municipal sewers are available at the edge of the site. Sewage may have to be pumped, since the sewer main is elevated above the industrial site. Depending on the number of industries, it may be necessary (and perhaps desirable) to gravity feed into a common pumping station that is municipally owned and maintained, rather than having several individual pumps owned and maintained by the various industries each pumping into the sewer main. The anticipated quantity of sewage from proposed industries and the types of process wastes should be reviewed to insure that adequate capacity and treatment is available through the municipal system. Certain wastes may not be acceptable, and approval should be provided by the Department of Environmental Protection and the local sewer authority for the type, quantity, and method of disposal.

FOUNDATION DEVELOPMENT AND GRADED CONDITIONS

Foundations, Slopes. The bearing capacity of the substratum appears adequate for the normal loads associated with building construction. For slope stability, it is recommended that cuts and fills have slopes no steeper than 3 feet horizontal to 1 vertical. This is also conducive to ease of maintenance.

Drainage. Since the proposed industrial park consists mainly of hardpan soils, drainage will need to be prime elements in the plans. Subsurface drainage is recommended under all paved areas to minimize the maintenance cost due to frost heaves. Any major grading done along the slopes of Shepard Hill may require extensive surface and subsurface drainage to minimize seepage, sluffing, and/or icing.

Several eroded areas along the base of Shepard Hill's west slope indicate that substantial concentration of surface runoff has already occurred. Increasing this concentration of runoff by developing without providing adequate and safe outlets could have disastrous effects. Storm water must eventually get to the river; the main questions relate to the quality and quantity of the water to be discharged.

The question of quality is deemed most important by the persons responsible for the fish hatchery and for fish stocking programs along the Quinebaug River. At this point in the river there is a contributing drainage area of 475 square miles. In comparison, the site seems relatively insignificant. However, if the overall goal of improving the quality of the river is to be attained, it is important that each new discharge be evaluated and controlled to minimize any adverse effects. The potential for affecting the hatchery wells will be discussed in detail under the section, Potential Hazards.

The quantity of storm runoff is most important as it relates to downstream flooding potential. Again, the size of the site would appear insignificant in comparison to the watershed. However, the cumulative effect of present and future development throughout the watershed must be kept in mind when determining whether to provide appropriate storage on-site so that the resulting peak discharges are not changed from present conditions.

Erosion. Appropriate permanent and/or temporary erosion control practices should be installed at key locations prior to or during construction. These practices help contain silt and sediment within the site boundaries during the critical construction period.

For each industry, a drainage plan, final grading plan, plus an erosion and sediment control plan should be developed to handle sedimentation and permanent and temporary runoff. The plans should include the timing of construction, handling of runoff with waterways and diversions, temporary and permanent seedings (including lime and fertilizer needs), and specific erosion control measures. The Erosion and Sediment Control Handbook for Connecticut, which outlines the type, purpose, and design procedures for many of these practices, is available through the local Soil and Water Conservation District. The District can also provide some technical assistance in the preparation and review of such plans.

ROADS AND UTILITIES

Shepard Hill Road will most likely need improvement to handle the heavier traffic. Present access to Route 52 will cause an increase of traffic on Route 12 toward Central Village. If and when I-84 is constructed, it will lessen the traffic impact.

Roads constructed on the site in the hardpan soils may expose that surface to seepage. This seepage can cause the banks to sluff and/or, in winter, ice to accumulate. Subsurface and surface drainage plans should take this into account.

POTENTIAL HAZARDS

It has been indicated the entire industrial development will be serviced by the existing sewer and water facilities resulting in no need for on-site services. This is a defininte plus for this site and will substantially reduce many of the negative aspects of such a development. During the on-site review there was some concern expressed as to possible adverse affects on the fish hatchery's existing and future water supply wells by the development of Shepard Hill into an industrial park. The hatchery utilizes large quantities of water from six active screened gravel packed wells located within the stratified drift deposits under the eastern floodplain of the Quinebaug River. Wells placed in such coarse-grained saturated deposits are excellent sources of large volume water supplies. Fluid flow is extremely rapid between the individual sand and gravel grains. This results in quick replenishment from surrounding areas as water is withdrawn from gravel packed wells. For this reason wells of this type may be more susceptible to contamination from surrounding sources of surface and subsurface pollution.

Because municipal sewer services are to be provided by the city, only pollutants directly generated by the presence of the buildings, roads, and automobiles within the park area will be potential problems for the hatchery wells. Typical changes to water quality that can be expected from man's developments are a rise in surface water runoff and temperatures, the presence of fertilizers, pesticides

and herbicides from lawns, a high oxygen demand, and large amounts of heavy metals, notably lead and zinc. Based on the topography it appears pollutants carried by overland runoff from most of the proposed site will be no threat to the hatchery's water supply since existing surface drainage patterns carry most water to the north and eventually into the surface waters of the Quinebaug (see drainage divide on west side of Shepard Hill on map on page 8).

However, there are places along the western portion of the proposed site that do drain toward the well system. Also, if care is not taken to maintain the existing predominant natural drainage system to the north during and after development, larger areas of the site may be diverted to drain toward the well system. The problem arises when polluted runoff flows to the west and reaches the till - stratified drift contact. At this point, because the sands and gravels take in surface water rapidly, whereas till does not, any contaminated fluids pass easily and quickly to the ground water table where it flows toward the river in a southwesterly direction. If wells on the floodplain are withdrawing water there is always the possibility that some diluted form of this runoff from the industrial park may be taken up with the well water. The effect, if any, cannot be known at this point in time or from this level of investigation. However, it would be safe to say by planning a development program which minimizes over land runoff from the site to the till-stratified drift recharge area along the western boundary, there should be little or no effect on ground water quality in this area. Methods to accomplish this may range from diverting the existing westerly drainage to the north where possible to leaving an undeveloped buffer strip along the western property boundary.

Air pollution is another potential hazard associated with an industrial development. Of particular concern is the impact on the White Pine forest previously described. Eastern White Pine (Pinus Strobus) is a "sensitive" species subject to air pollution damage from the following common industrial pollutants: sulfur dioxide, hydrogen flouride, ozone, oxides of nitrogen, chlorine, and mercury vapor.

Air currents will carry pollutants from the proposed site to the adjacent river valley. Industries emitting the above mentioned compounds could cause serious damage to this unique forest resource. The winter wind direction is from the proposed industrial park to the fish hatchery. Therefore, if the hill is developed, pollutants which may fall out onto the ponds and be toxic to fish should be controlled (i.e. sulfur dioxide, nitrogen dioxide, etc.).

AESTHETICS AND PRESERVATION

Preserving a buffer strip on the western side and at the base of Shepard Hill, particularly in the vicinity of the till-stratified drift contact, would be beneficial. The area has severe limitations for development and would furnish excellent upland wildlife habitat along with the State lands adjacent to the river. This area would also provide some erosion control and protection from sedimentation.

The expression "industrial park" has several definitions and connotations, and should be investigated in depth. Generally speaking, an industrial park is an integrally designed project, as dictated by a comprehensive plan of development, that combines varying degrees of industrial, open space, and other desired

uses into a park-like environment.

If the proposed site and the area of potential expansion are not incorporated into a unifying plan, there will be definite visual incongruities such as contrasts in architectural style, varying degrees and types of landscaping, and differences in siting and engineering, all of which contribute to the aesthetics of the entire project. If each industrial development is considered independently from the others, a "piecemeal-like" effect will result. Aside from the aesthetic viewpoint, there are also many ecological, environmental, economic, and efficiency advantages from creating a comprehensive plan of development. Therefore, such a plan is strongly recommended.

One of the most obvious problems encountered when analyzing a proposal such as this, is to discern the potential visual impacts brought about by the intrusion of man-made objects and structures into a rather rural and natural landscape. Both existing industries exhibit aspects which have a negative impact.

American Standard is located at a lower elevation than Route 12 and is not sufficiently buffered or landscaped, thus creating a detraction from vantage points along Route 12. The parking lot for Novelty Textiles is adjacent to Route 12 and insufficiently buffered. Due to the building's lower elevation, the exposed roof hardware is visible from Shepard Hill Road. These items are ones which significantly detract from the naturalness of the area and which should be avoided in future industrial development of the area.

Since this region is characterized by open space, the industrial park should be such that it does not significantly alter the status quo. The following suggestions are offered for consideration in designing the industrial park so as to minimize its impact on the landscape:

1. Limit industrial park clients to light and medium industries.
2. Open space: building ratio should be 4.75:1 for combinations of fair and good quality structures. That is, there should be 4.75 acres of open space for every acre of ground floor space (approximately 20 acres of 114 acres).
3. There should be no poor quality structures.
4. Architectural styles and motifs should reflect the nature of the rural atmosphere and landscape contours. This includes color.
5. Buildings should be sited so that roof hardware is not visually accessible. If unavoidable, parapits should be used.
6. Clustering of independent industries (where expansion is not anticipated) has aesthetically-oriented advantages as well as economic ones. Clustering will provide for a concentration of structures and associated facilities while also providing more open space for public and/or employee recreation.
7. Cuts and fills should be minimized so as not to alter the existing relief and topographic character.
8. Natural drainage systems should be maintained, and their discharge quality should not be reduced.

9. There is little natural hardwood vegetation present (approximately 14%), yet it should be preserved. Since the site is rather barren, landscaping should be used extensively, not only to increase the park-like appearance but also to reduce potential unchecked erosion. The landscaping program should be coordinated on a timetable basis. That is, there should be fast-and medium-growing species to compensate for the slower ones. Indigenous, rather than exotic species, should be planted so that in the long run the site will approximate its normal state. Flowering species such as dogwood could be used as enhancers until the larger species such as maples reach maturity.

10. Parking areas should be sited, landscaped, and buffered so they are as inconspicuous as possible. Broad expanses of pavement should be broken up with grassed and tree planted areas.

11. Electric utilities should be located underground (in cooperation with CL&P and SNETCO) so as to eliminate the overhead cables and utility poles.

12. Construction materials should reflect the character of the region and its landscape.

13. Wildlife populations need not be displaced, and can even be increased, if a suitable wildlife habitat is provided. Groups of selected fruiting shrubs can attract many local fauna and add to the "park" concept of the industrial park.

Considering the above guidelines in preparing a comprehensive plan for the site, it should be possible to design an environmentally sound project which detracts little from the natural quality of the region. It would also provide a pleasing environment for employees and visitors.

COMPATIBILITY WITH SURROUNDING LAND USES

The 1973 Plan of Development for Plainfield proposes additional industrial development around the existing industries and commercial development of Shepard Hill Road. The Plainfield Planning and Zoning Commisssion has indicated their support for the proposed industrial park (see preapplication for letter of support). The regional land use and water and sewerage plans also support the concept of additional industrial development in the Wauregan area.

Compatibility with the adjacent fish hatchery is questionable. Eventual development, particularly on the western side of Shepard Hill, will determine to a large degree the compatibility. Industries located here should be chosen and designed carefully to minimize the potential hazards from runoff, accidental spills of chemicals or other materials, and air pollutants.

Selection of industries with low air pollutant levels will also ensure compatibility with the nearby forests. By protecting the adjacent forest and water resources, they will continue to offer a truly high quality environment for recreation for people living and working in the area. Hunting, fishing, hiking, nature study, and boating opportunities are available in abundance.

ALTERNATIVE LAND USES FOR THE AREA

The prime alternative for this site would be for it to continue in agricultural use. In general, hardpan soils are better suited to agriculture than to intensive development. Other possibilities for the site would be recreation or low density residential development.

SUMMARY

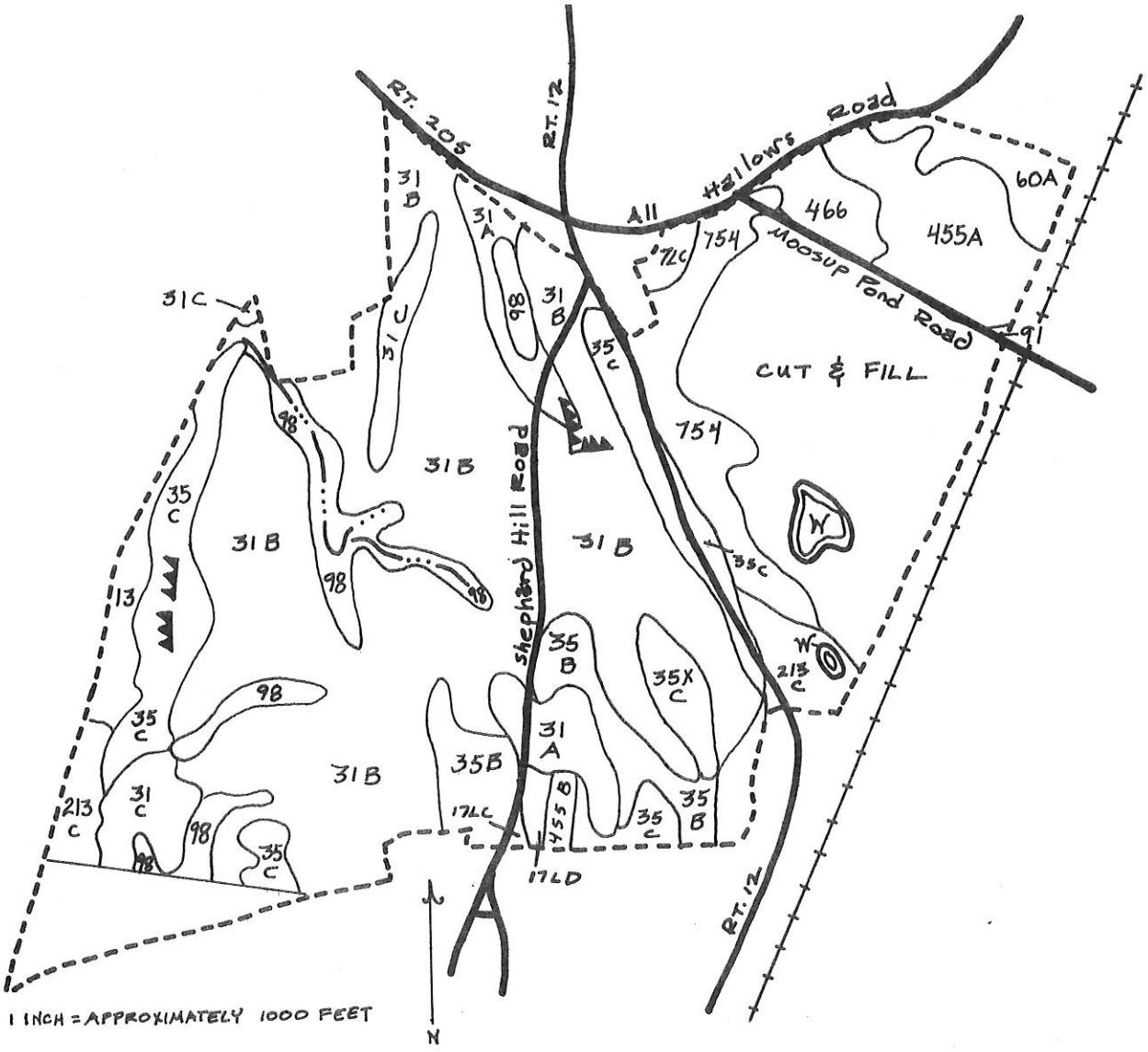
Provided the limitations imposed by the site's location adjacent to the Quinebaug fish hatchery do not interfere with the desires of the Town regarding an industrial park, it would appear that this is a feasible location. Protection of the nearby forest is also a major concern. There are natural limitations arising from the hardpan soils which will necessitate extensive drainage plans. Careful design which takes the existing nature of the area's landscape into consideration and minimizes the negative aspects of man-made structures will contribute to the development of an attractive industrial park. Future plans for the site should take these factors into consideration. In addition to the comprehensive plan, each industry should also prepare site plans showing building layout, drainage, grading, erosion control, architecture, and landscaping.

APPENDIX

SOIL MAP

SHEPARD HILL INDUSTRIAL PARK

PLAINFIELD, CONNECTICUT



Prepared by: UNITED STATES DEPARTMENT OF AGRICULTURE, Soil Conservation Service

ADVANCE COPY, SUBJECT TO CHANGE *MAY, 1975*

SOILS LIMITATIONS CHART
FOR PROPOSED INDUSTRIAL PARK

Natural Soil Group*	Mapping Symbols	Acres	Percent of Total Acres	Limitations For:** Basements	Landscaping	Streets and Parking	Principal Limiting Factors(s)
A-1b	213C	14.6	12.0	2	3	3	Slope 3-15%, droughtiness.
C-1b	35C	15.2	12.5	2	2	3	Seasonal high water table, slope 8-15%.
C-2a	31A	4.4	3.6	2	2	2	Seasonal high water table.
C-2a	31B	70.2	57.4	2	2	2	Seasonal high water table, slope 3-8%.
C-2a	31C	5.2	4.3	2	2	3	Seasonal high water table, slope 8-15%.
C-3a	98	12.4	10.2	3	3	3	High water table.
		122.0	100.0				

* Refer to Know Your Land, Natural Soil Groups for Connecticut, Soil Conservation Service, USDA Connecticut Cooperative Extension Service, for further explanation of the natural soil groups.

** Limitations: 1-slight; 2-moderate; 3-severe.

SOILS LIMITATIONS CHART
FOR AREA OF POTENTIAL INDUSTRIAL EXPANSION

Natural Soil Group*	Mapping Symbols	Acres	Percent of Total Acres	Limitations For:**			Principal Limiting Factors(s)
				Basements	Landscaping	Streets and Parking	
Area South of Proposed Industrial Park.							
A-1b	213C	11	9.2	2	3	3	Slope 3-15%, droughtiness.
A-2	455B	2	1.7	2	2	2	Seasonal high water table.
C-1a	35B	9	7.6	1	1	2	Slope 3-8%.
C-1b	35C, 35XC	18	15.1	2	2	3	Slope 8-15%.
C-2a	31A, 31B	62	52.1	2	2	2	Seasonal high water table, slope 0-8%.
C-2a	31C	7	5.9	2	2	3	Seasonal high water table, slope 8-15%.
C-3a	98	7	5.9	3	3	3	High water table.
D-1	17LC	1	0.8	3	3	3	Shallowness, slope 3-15%.
D-2	17LD	2	1.7	3	3	3	Shallowness, slope over 15%.
		119	100.0				
Area North of Moosup Pond Road.							
A-1a	60A	8	25.8	1	2	1	Droughtiness.
A-2	455A	17	54.8	2	2	2	Seasonal high water table.
A-3a	466	6	19.4	3	3	3	High water table.
		31	100.0				

* Refer to Know Your Land, Natural Soil Groups for Connecticut, Soil Conservation Service, USDA Connecticut Cooperative Extension Service, for further explanation of the natural soil groups.

** Limitations: 1-slight; 2-moderate; 3-severe.