Long Meadow Brook, LLC Development

Naugatuck, Connecticut

King's Mark Environmental Review Team Report

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

Long Meadow Brook, LLC Development
Naugatuck, Connecticut

Environmental Review Team Report

Prepared by the

King's Mark
Environmental Review Team

Of the

King's Mark
Resource Conservation & Development Area, Inc.

For the

Zoning Commission
Naugatuck, Connecticut

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Connecticut Environmental Review Team Program
www.ctert.org

Acknowledgments

This report is an outgrowth of a request from the Naugatuck Zoning Commission to the Southwest Conservation District (SWCD) and the Eastern Connecticut Resource Conservation and Development Area (RC&D) Council for their consideration and approval. The request was approved and the measure reviewed by the Eastern Connecticut Environmental Review Team (ERT).

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

The field review took place on Wednesday, February 7, 2007.

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**R. Mrozinski reviewed and wrote a report for the project in October 2006 which is reprinted in the Appendix of this report. He did attend the field review on 2/7/07 but did not issue a new report.*

I would also like to thank Steven Macary, Naugatuck zoning enforcement officer, Michelle Ryan, Naugatuck engineering department, Alan Shepard, project engineer, Roger Spinelli, applicant/owner, and the applicant's attorney for their cooperation and assistance during this environmental review.

Prior to the review day, each Team member received a summary of the proposed project with location and soils maps. During the field review Team members were given plans and other reports and maps were made available later. Some Team members made separate or follow-up visits to the site. Following the review, reports from each Team member were submitted to the ERT coordinator for compilation and editing into this final report.

This report represents the Team's findings. It is not meant to compete with private consultants by providing site plans or detailed solutions to development problems. The Team does not recommend what final action should be taken on a proposed project - all final decisions rest with the town and applicant. This report identifies the existing resource base and evaluates its significance to the proposed use, and also suggests considerations that should be of concern to 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 reviewing this proposed residential development.

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Introduction

Introduction

The Naugatuck Zoning Commission has requested Environmental Review Team (ERT) assistance in reviewing a proposed active adult residential community.

The 27 acre site is located on Webb Road and Rubber Avenue Extension in the northwestern section of Naugatuck near the Middlebury town line. Long Meadow Brook traverses the site. The site is a former nursery and contains a home and outbuildings/greenhouses associated with the nursery.

A Fall 2006 application for an active adult community was withdrawn and there was no residential application pending at the time of the ERT review. The applicant had submitted at the time of the ERT review a proposal for four large storage buildings and associated parking, etc. But the town envisions residential use the goal for the site and the ERT Team was asked to review the previous residential proposal and to comment on residential development potential.

The active adult proposal was for a 21 two unit adult condominium community with a total of 42 townhouse and ranch units with a community building. Two new roads would be constructed involving two wetland crossings. Also proposed were two detention basins. The site would be served by public water and sewer. The Team was made aware of an area of rubber fill that is to be removed.

Objectives of the ERT Study

Naugatuck has requested the ERT to assist in review of this site and proposed residential development because of the following issues and concerns: the close proximity of development to wetlands and watercourses; concern about stormwater management and erosion and sediment controls; soils limitations and opportunities; impacts to wetlands and aquatic habitats and traffic and access.

The ERT Process

Through the efforts of the Naugatuck Zoning Commission this environmental review and report was prepared for the City of Naugatuck.

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

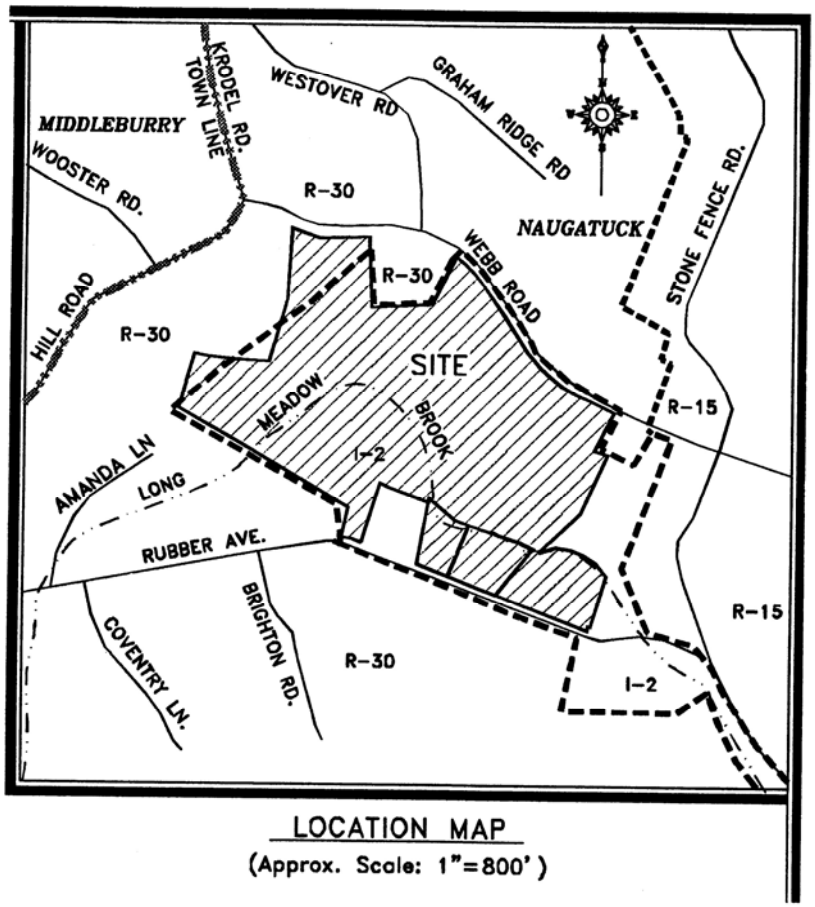
applicant. The Southwestern Conservation District reviewed this project for Naugatuck in the Fall 2006 and wrote a report dated 10/13/06. This report is included in the Appendix.

The review process consisted of four phases:

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

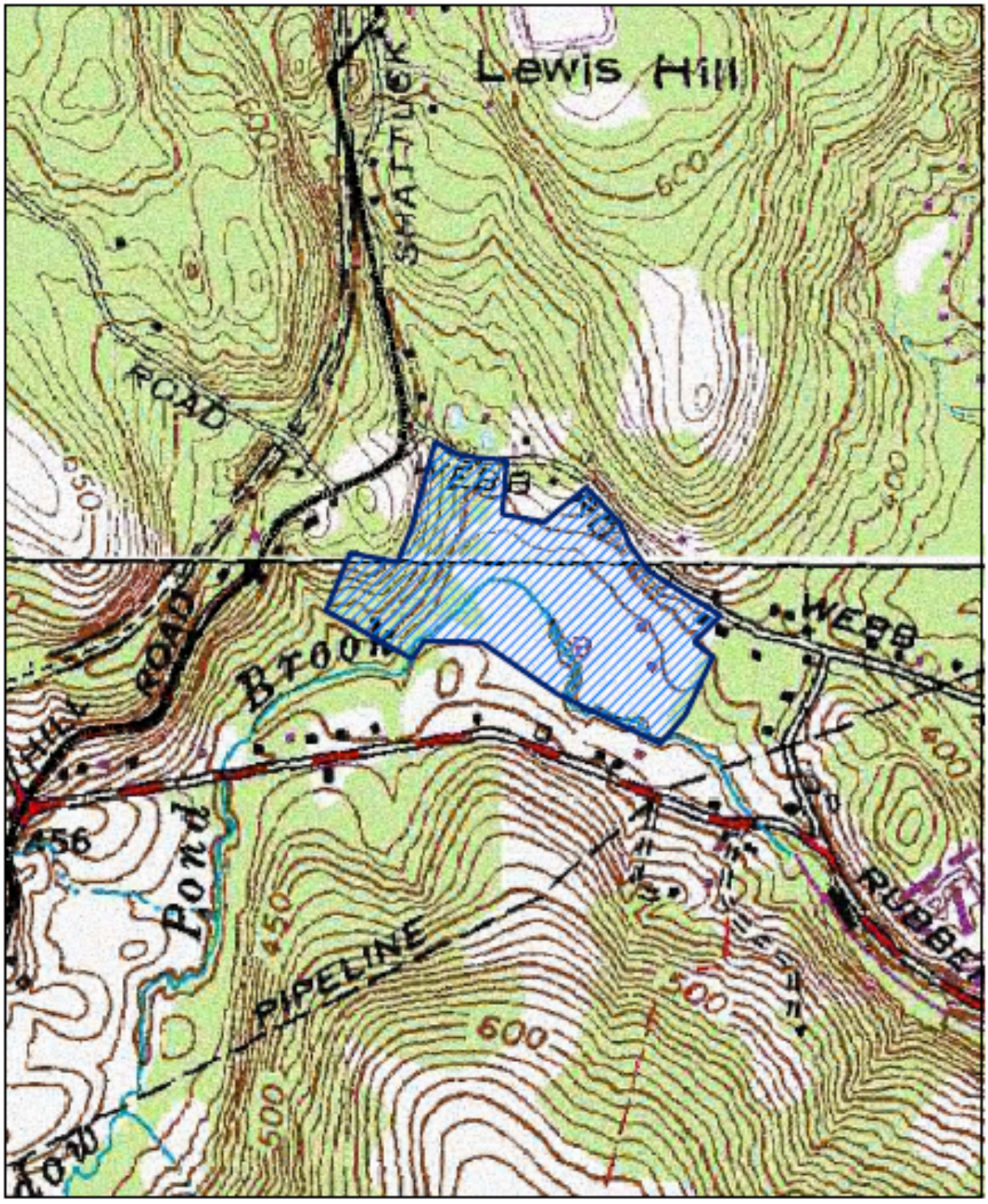
The data collection phase involved both literature and field research. The field review was conducted Wednesday, February 7, 2007. The emphasis of the field review was on the exchange of ideas, concerns and recommendations. Being on site allowed Team members to verify information and to identify other resources.

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



LOCATION MAP
(Approx. Scale: 1"=800')

Long Meadow Brook, LLC Topo Map



The Connecticut Environmental Review Team

This map was prepared by Amanda Fargo-Johnson for the Connecticut Environmental Review Team. This map is for educational use only. It contains no authoritative data. January 2007.

Naugatuck, CT

0 0.05 0.1 0.2 0.3 Miles

N

Long Meadow Brook, LLC Aerial Map

The Connecticut Environmental Review Team

This map was prepared by Amanda Fargo-Johnson for the Connecticut Environmental Review Team. This map is for educational use only. It contains no authoritative data. January 2007.

Naugatuck, CT

0 0.025 0.05 0.1 0.15 Miles

N

Topography and Geology

Topography

Long Meadow Brook occupies a valley in Naugatuck that has steep sides and is relatively narrow (see Figure 1). Drumlin shaped hills with elevations between 600->800 feet surround the valley. The proposed development is planned for a parcel located where the valley is anomalously wide, about 0.25 miles. Here the valley bottom is a relatively flat flood-plain and terrace.

Along the margins of the valley are sand and gravel deposits at elevations slightly higher than the modern flood-plain. They form a poorly defined terrace whose river-side margins may be within the modern flood-way. It is upon this terrace and on some of the lower valley side slopes that the development is proposed.

The river currently is down-cutting, typical of most rivers in Connecticut. This is related to a decrease in soil erosion and resulting decrease in sediment load brought to the rivers during the modern post-agricultural era. The river will probably adjust more to the decrease in sediment supply by continuing to down-cut and eventually will establish a new flood elevation. River-bank erosion may be expected at some point.

Geology

Bedrock is nowhere exposed on the parcel. It consists of schist to the south and various gneisses to the north (Carr, 1960; Rodgers, 1985).

The surficial geology (see Fig. 1) consists of deposits of glacial till on the uplands and melt-water stream deposits in the valley bottom (Flint, 1978). Modern river alluvium overlies some of the glacial stream deposits. The till on bordering hills is thicker than normal and in some locations shows evidence for two types of till (two different ages?). Till was observed in the field where it had been excavated (Fig 2, 3). There, the till was rocky and clayey. The clay content rendered the artificially steepened slopes subject to small amount of soil creep, evidenced by bent tree-trunks (fig. 2). This suggests that care should be taken not to create over-steepened slopes in areas where the till will be excavated to make level plots on which to build.

Several large boulders were seen in till (Fig. 3), in drainage-trenches that had been dug through the terrace, and at other places on the parcel. These coincide

with the ice retreat (melt-back) boundary dated at 16,500 years ago (Stone and others, 2005) and may be related to moraine-forming processes at that boundary. 100-year and 500-year flood boundaries are shown on the plans. No structure is located within the 100-year flood boundary, but parts or all of six units are within the 500-year flood boundary. In addition, if roadways are not constructed with sufficient elevation at wetland and water-course crossings, additional units may be isolated during a 500-year flood. Large events have been increasing in frequency during recent years. It is the opinion of this reviewer that this is a result of weather changes associated with global-climate change and that such events must be anticipated in with increasing frequency in the near term. Thus, where it may be within the letter of the law to allow development within the 500-year flood zone, it may not be prudent to place so many structures within harms way, even if they are flood-proofed. Lack of prudence in search of greater economic pay-out does not seem ethical to this reviewer. In addition, it is likely that upslope development in the watershed has already increased peak flood-elevations of local streams, exacerbating the situation.

References

Carr, Michael H., 1960, The bedrock geology of the Naugatuck Quadrangle, with map. State Geol.and Nat'l Hist. Surv of Connecticut, Quad. Rept. #9, 25p.

Flint, R.F., 1978, The surficial geology of the Naugatuck Quadrangle with map. State Geol.and Nat'l Hist. Surv of Connecticut, Quad. Rept. #35, 23p.

Rodgers, John, 1985, Bedrock Geological Map of Connecticut. Connecticut Geological and Natural History Survey, Natural Resource Atlas series, 1:125,000, 2 sheets.

Stone, J.R., Schafer, J.P., London, E.H., DiGiacomo-Cohen, M.L., Lewis, R.S., and Thompson, W.B., 2005, Quaternary Geologic Map of Connecticut and Long Island Sound Basin (1:125,000). U.S. Geol. Surv. Sci. Invest. Map # 2784.

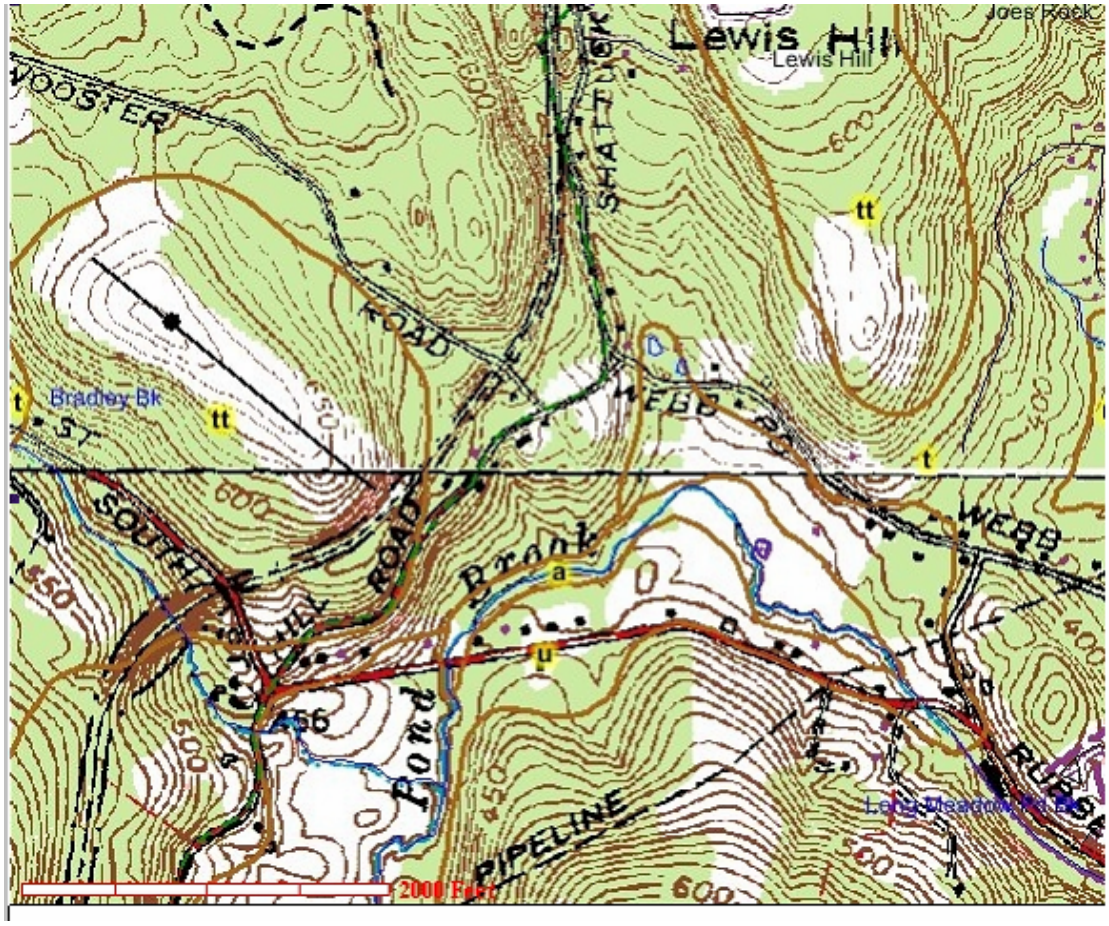


Figure 1. Topographic map with overlay of boundaries of various surficial materials of Quaternary age. A = modern river alluvium, u = ice-contact sand and gravel deposits associated with downstream bedrock sill or ice dam, t = glacial till, tt = thick till. Line with black dot near center is axis of drumlin-like feature.

Figure 2. Trees not growing heliocentrically and slight curvature of tree trunks are indicative of slight soil instability on artificially steepened slopes that resulted from excavation of till at some point in the past. Notice boulders in the till.

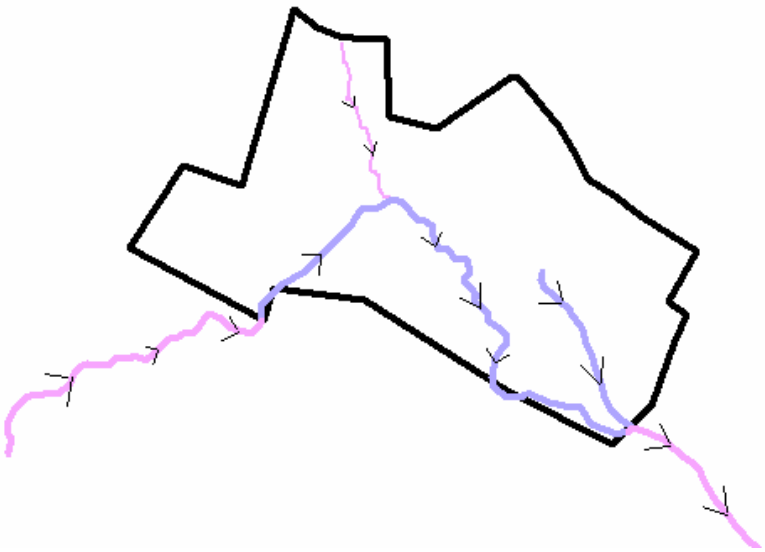
Figure 3. Bouldery till exposed by excavation. Boulder concentration here is greater than is average for area. This coincides with ice retreat boundary mapped by Stone et al (2005) and may be a poorly developed end moraine.

Wetland Review

The ERT Team visited the site on February 7, 2007 and examined the 27 acres proposed for an active adult community. It was immediately apparent to the Team that most all of the landscape had been historically disturbed.

The site is currently dominated by the remains of a nursery business and a legacy of land use that would not pass today's regulations. None-the-less, the proposal calls for a community of twenty one two-unit adult condominiums and the introduction of 2,900 - 3,000 linear feet of new road. Two wetland crossings are proposed.

The most dominant wetland is Long Meadow Brook and its floodplain. It flows for about 1,800 feet on the property. It meanders across the site as seen in the graphic below. An unnamed brook that enters the site from the northwest and flows on the parcel for about 625 feet is a major tributary of this reach of Long Meadow Brook. This tributary has a watershed of approximately 95 acres. Another unnamed stream drains the east central portion of the site, though from its straight channel-like configuration it appears to have been installed for drainage purposes.



The approximate parcel boundary and the watercourses that flow across it are seen here.

Black arrows indicate the direction of water flow.

The meadow abutting the large meander of Long Meadow Brook is one of the few riverine flood plain meadows in the area. In the last 70 years the nature of the floodplain has changed markedly, as seen on the aerial photographs below.

This aerial photograph dates from the spring of 1934. Note that quite a lot of the floodplain is inundated with water (black), which transitions in the north-west to more of a shrubby emergent wetland.

This second photo was taken in the spring of 2004. The ponded water is no longer present in the large meander. It is possible that in the 1934 era the damming of the stream further downstream resulted in the impoundment we see above.

(Sources: top photo is Connecticut State Library {CSL} photograph number 04176; lower photo is the base photo used by MapQuest as of the date of this writing.)

The topography of the site ranges in elevation from about 380 feet above sea level in the floodplain to 440 along Webb Road and to 460 feet in the extreme northwest corner of the western arm of the parcel. In this western location some slopes measure in the 25-30 degree range of steepness.

Land Use Change

Each of the two comparative photographs (above) represents an area of about 210 acres. Seventy years ago the land was dominated by agricultural fields and roadways. At most, a handful of houses sprinkled the landscape. In the intervening decades the demise of agriculture and the maximizing of land for development has been evident. At present there are no less than 102 houses on these same 210 acres. Thousands of feet of roadway and thousands of square feet of driveways, roof tops and other impervious surfaces have been added to the watershed. Additionally, a large wetland has been drained and turned to meadow.

In the statewide aerial survey of 1934 some locations had to be re-photographed to fill gaps in the initial coverage. As a result, the wet meadow floodplain wetland in question was photographed twice that spring. Below is the fill-in shot. Notice that the two oxbow meanders in the middle of the wetland have had cutoffs placed along their tops.

By straightening the stream the farmer could increase his usable farmland. But channeling like this decreases erosion-reducing shoreline contact and promotes faster stream flow. Faster stream flow in turn cuts deeper into the channel and decreases the opportunity to meander across the floodplain.

(Source: CSL photograph number 07117.)

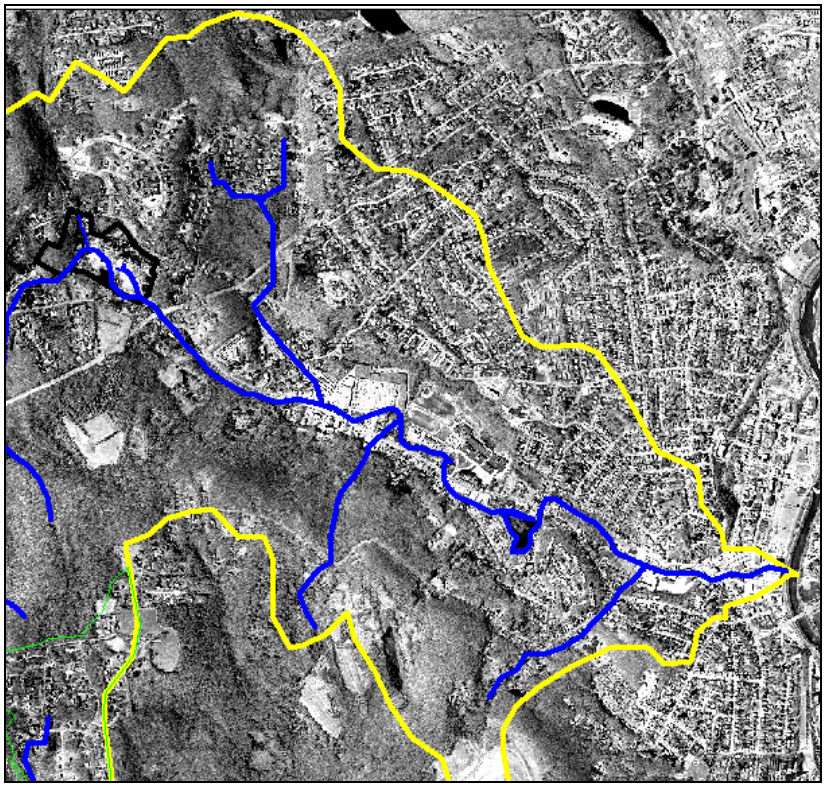
Discussion: The Watershed

The long term health of the Long Meadow Brook and its riparian wetlands is the desired goal. After construction of this proposal, the long term health needs to be

perpetuated, which is why now there are wetland setbacks, review areas and riparian corridors. Water quantity and quality will be the issues. Planning today for project by project oversight of development in the watershed will take into account the entire watershed, the big picture, and protect the long-term wetland and watercourse health.

The Brook's first 5.7 miles, from the headwaters through the property, is classified by the DEP's the Water Quality mapping as "A". This classification seems appropriate as there is very little upstream development. The "A" is from a rating scale where "AA" is the best, "A" being next, then "B", "C", and finally "D". The further into the alphabet the more degraded the water quality. (The full text of the DEP's *Water Quality Standards and Criteria* can be found on the web at: http://www.ct.gov/dep/lib/dep/water/water_quality_standardsl/wqs.pdf)

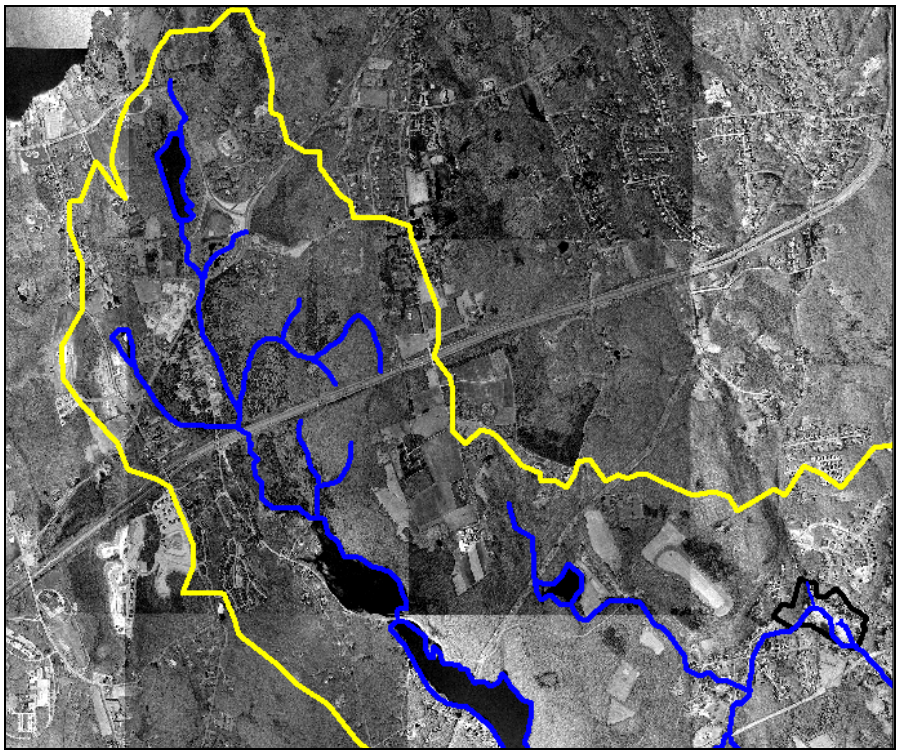
But the water quality changes from 'A' to 'B' about 3,350 feet downstream after a tributary referred to as Jones Street Brook enters. Long Meadow Brook maintains classification 'B' for its final 9,415 feet until its confluence with the



This aerial photo shows the project boundary in black, the watershed boundary in yellow and the waterways in blue.

It also depicts the density of land use present in the lower part of the watershed. The wiggly blue "Y" tributary east of the property is Jones Avenue Brook below which the water quality degrades from 'A' to 'B'.

Naugatuck River. A review of the watershed shows light land use upstream of the site and heavier, more intense land use below.

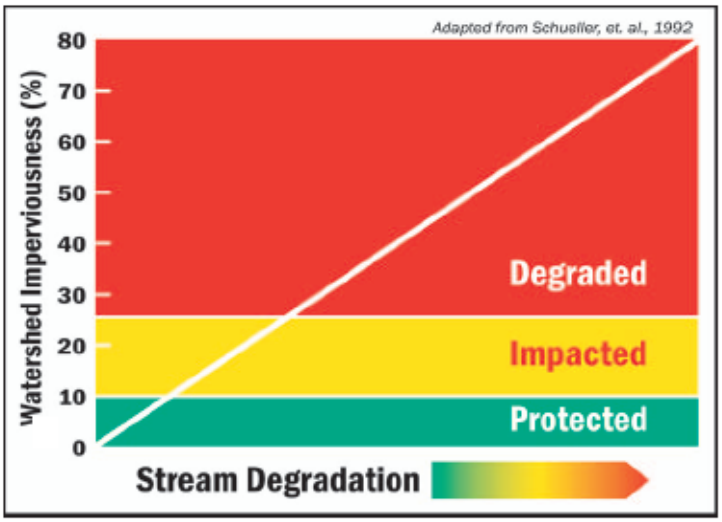


In this view approximately 2,360 acres of the watershed above the property are depicted. Of those, roughly 145 acres, or about six percent, are in subdivisions.

A rule of thumb for any given drainage: the water quality decreases as impervious surface in the watershed increases. (Impervious surfaces are generally thought of as roads, driveways, roof tops, sidewalks, etc.) The numbers/ranges seen in the graphic below are often referred to when reviewing long term health of the watershed.

There is a correlation between the percentage of imperviousness in the watershed and the effects of this land use on water quality. Generally speaking the water quality of the stream is considered to be well protected when the imperviousness in the watershed is 0-10 percent of the total land cover. The studies show that from that 10 percent to about 26 percent imperviousness, the water quality is compromised. After ~26 per cent definite degradation is taking place. As with many studies, the numbers are not absolute for every scenario, but the concept is sound.

Impervious surfaces then become a critical predictor of future water quality. The University of Connecticut program for Nonpoint Education for Municipal Officials (NEMO) has produced a fact sheet regarding this issue. It features the following graphic to make the point about impervious surface and water quality discussed above:



This graphic is taken from NEMO Fact Sheet Number 3 entitled: Impacts of Development on Waterways. *The fact sheet and this graphic are available on line at: http://nemo.uconn.edu/tools/publications/fact_sheets/nemo_fact_sheet_3_s.pdf .The NEMO URL: http://nemo.uconn.edu/tools/publications.htm may be visited for many other Facts Sheets on Nonpoint pollution information for municipal officials.*

As land development creeps up the Long Meadow Brook valley towards the top of the watershed, application by application land use decisions for water quality maintenance are best made based in response to a long term plan for the watershed.

The Wet Meadow

A meadow in Connecticut is not a common land form, a wet meadow is even less so. In 2003 the Connecticut Grassland Working Group found that approximately two per cent of the state is in meadow and field. Historic figures from the pre-colonial era estimate approximately nine per cent of the land had these attributes.

As land in the state reverts back to forest from farms and fields the loss of this grassland habitat has been telling on wildlife, especially regarding grassland birds. Once the proposed development is concluded, for these reasons it may well be worth contacting the local Audubon chapter http://naugatuckvalleyaudubon.org/ to discuss the possibilities of managing the wet meadow area for specific wildlife needs.

Wetland Crossings

All of the wetlands have been delineated and described in the report entitled: *Engineering Report for Long Meadow Brook LLC*. Two wetland crossings are proposed, both being along the proposed main east - west road. At the time of the Team visit both areas were frozen.

This view is along the proposed main road looking east at the first crossing. It was frozen at the time of the visit but day/night freeze/thaw action allowed for the melting and freezing which caused this ice over. A 12 inch reinforced concrete pipe is proposed.

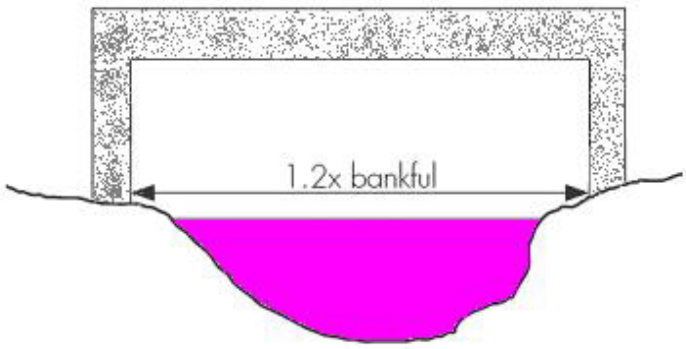
The second stream (westernmost) is proposed to be culverted in a 15 inch reinforced concrete pipe under the proposed road. This unnamed stream has a 95 acre± natural drainage area, with slopes frequently in the 11 to 19 per cent range. This stream passes under Webb Road in a 48 inch pipe. This reviewer concurs with Mr. Shepard's suggestion of using a larger passage at road station 16+90. This would be more in keeping with the current best management practices of crossings. For this type of crossing the Army Corps of Engineers General Permit specifies:

Driveway/Roadway Crossings. The following are required for driveway/roadway crossings constructed on brooks, streams, rivers and their tributaries. These provisions do not apply to crossings of drainage ditches or waters with no definable channel.

• **Driveway crossings using a bridge or open-bottom structure must**:
- span at least 1.2 times the watercourse bank full width,
- have an openness ratio(7) equal to or greater than 0.25 meters, and
- allow for continuous flow of the 50-year frequency storm flows
-

• **Roadway crossings using a bridge or open-bottom structure must:**
- follow the above 3 requirements for driveway crossings, and
- have a riparian bank on one or both sides for wildlife passage.

The open bottom culvert using a minimum 1.2 times bankful width is the current convention. This width allows for small wildlife passage along the stream bank during periods of normal flow. It is depicted in the *Massachusetts Stream Crossing Handbook* which is available at: http://www.nae.usace.army.mil/reg/Riverways%20Program%20Stream%20Crossings%20Handbook.pdf and specified in the Army Corps of Engineers General Permit in the State of Connecticut, effective May 31, 2006 http://www.nae.usace.army.mil/reg%5Cctpgp.pdf (see Appendix A, page 2, left column).



The base image for this graphic was taken from the Massachusetts Stream Crossing Handbook *and depicts the concept of wider-than-bankful, open bottom, box culvert. The open bottom allows for natural stream substrate and the extra width allows for small animal passage.*

Impervious Surfaces

This plan proposes the introduction of +2,900 linear feet of 26 foot wide roadway. This adds approximately 1.75 acres of impervious surface or 6.5% of the parcel. Add to this number the surface area of:

Residential roof tops: 1.5 acres (5.4%)
Driveways: .33 acre (1.2%)
Clubhouse, Clubhouse parking, Porch Pads, Refuse Enclosures: .25 acre (1%)

and the total impervious surface is about 3.8 acres or 14% of the property. In effect, the builder creates a water runoff and sediment collection system to service the needs of the newly built subdivision. The long term maintenance of this system then becomes the burden, in perpetuity, of either the town or the newly assembled homeowner/condominium association.

Typically, runoff from impervious surfaces is channeled into roadways, then directed by the curbs downhill to pass into storm drains. The storm drains in turn outlet into, or just upslope of, wetlands. Minimizing impervious surface is one

way to decrease this runoff, and thus decrease the impacts to the wetland systems.

Road Width: One of the most straightforward ways to reduce impervious surfaces is to decrease the width of the road. A reduction in road width from 26 feet to 24 feet would decrease impervious surface in this proposal by nearly 6,000 square feet. The following paragraphs explain why this may be an advantage:

In the city of Longmont, Colorado approximately 20,000 police accident reports were reviewed and compared against five criteria that would signify the probability that street design contributed to accidents. The analysis showed that a typical 36 foot wide residential street has 1.21 a/m/y (accidents/mile-year) as opposed to 0.32 for a 24 foot wide street, the street with the least a/m/y. This is about a 400 percent increase in accident rates. The analysis illustrates that as street width increases, accidents per mile per year increases exponentially, and that the safest residential street width is 24 feet (curb face).

The Connecticut Nonpoint Education for Municipal Officials project (NEMO) embraces the same thinking in their Technical Paper Number One. It may be viewed on their website (http://nemo.uconn.edu) . Quoting in part:

> "Designing Roads for Speed - As design speed declines, road widths narrow. Research shows that long, wide, straight roads produce higher traffic speeds and higher accident counts, particularly fatal accidents. Local residential roads should be designed to provide safe access to home sites and not as mini raceways. Research shows that narrow streets are the safest. For example, a study by Swift Associates and the City of Longmont, Colorado looked at 20,000 automobile accidents over an eight-year period and found, "The most significant casual relationships to injury and accident were found to be street width and street curvature . . . and that the safest residential street width is 24 feet." (Copies of the Swift Report can be provided as needed.)

A road width of 24 feet over the length of this project can provide the mutual benefit of minimizing impervious surface and offering a safer traffic environment.

Roof Runoff: very often the downspouts from the roof of a home direct water directly onto an impervious surface such as a driveway. It then flows into the street and down slope to storm drains. Collectively, these surface areas can be substantial. To reduce runoff and to most closely mimic the water path of preconstruction flow, two options are available. The first is to have the downspouts discharge directly into the ground. This eliminates runoff and will

aid in the on-site groundwater recharge on each house lot. Second is the construction of rain gardens which also provide the water with an opportunity to recharge or infiltrate into the groundwater.

The images above depict three different rain gardens. The top picture depicts the rain garden close to the downspout. The lower pictures show two rain gardens receiving piped roof runoff which enables the garden to be further away from the house. (Top photo courtesy of NEMO, others North Carolina State University.)

Road Sand: As the number and width of road surface miles per basin increases, so does the amount of road sand applied during the winter months. Some things to keep in mind:

Connecticut has a no tolerance level for snow and ice on its roads. As a result, large quantities of road sand are applied every winter to keep the travel ways

safe. The DEP estimates that on average in urban settings more than 40,000 pounds of sand (20 1/4 tons) is applied per road mile every year. Of that total, approximately 30-50% is collected in the spring through street sweeping. Thus, ~12 tons of sand is left on every road mile every year.

Because of the nature of the Connecticut's hill and valley topography, roads are often in close proximity to wetlands and watercourses, as they are on this site. This aspect of the landscape makes it highly likely that over time most of the uncollected sand will move downslope into the storm drain system and/or the wetlands and watercourses. These sediments can destroy aquatic habitat and fill in water bodies. The impacts of sand deposition (typically in combination with elevated salt levels and increased water temperature [thermal pollution]) on spawning streams and wetlands with close proximity to roads are well documented. Road sand itself can be a major pollutant source by carrying nutrients, oil, and metals with it to the rivers, streams, and lakes.

In the springtime, after the danger of icing, if the road sands are swept/collected later than sooner, the impacts are worse. This is because the constant grinding of automobile tires reduces sand particle size. These finer particles are held in suspension longer and carried further downstream.

Using the numbers above, approximately 11 tons of sand will be applied to the proposed ~2,900 feet of road every winter. Of this total perhaps 40 percent will be collected. This leaves ~6.6 tons, or 13,200 pounds of sand on the roads of this subdivision *every year*.

As a result of these potential long term road sand impacts, towns/homeowner associations are urged to sweep the roads as soon as possible in the spring and maintain their catch-basin clean out schedule. Many municipalities, unwilling or unable to take on the maintenance of new systems' maintenance call for a homeowner's association to be formed. The Association then assumes a plan with an agreed upon schedule of maintenance intervals with the town. Reasonably, the town wetland, conservation or public works sector keeps abreast of the status of the maintenance.

Additionally, accessibility pathways for heavy equipment must be placed during construction to provide the needed equipment with an approach the detention basins.

Miscellaneous

The steepness of slope in the westernmost phase of the project is a cause of concern. These are fine grained till soils and have the potential to move downslope into wetlands and watercourses with ease. Although all construction is

out of the review area, these are the finest of grain sizes, like groundup road sand. By their nature once they are in water they stay in suspension for a long period of time which translates to further downstream. Close watch of the erosion and sediment control can minimize this potential.

This view is of two ERT team members standing at the top of the slope in the western-most phase of the proposal just before it drops off into the wetland.

Here a Team member loosens some fine grained soil from the bottom of a downed tree not far from the location of the photo above. The powder-like soil particles, once in a watercourse, will be held in suspension and potentially cloud the water for quite a distance downstream.

Aquatic Habitats and Resources

Portions of the 27-acre Long Meadow Brook Age Restricted Development site (Site) have been previously developed for agriculture. Conifer plantations, fields, a residential dwelling and several outbuildings remain. A 1,500± - foot reach of Long Meadow Pond Brook *(DEP Drainage Basin #: 6917)* flows west to east across the southwestern portion of the Site.

Aquatic Habitats

Long Meadow Pond Brook is physically characteristic of a low-gradient coldwater stream found in Connecticut. The brook transitions notably from a moderate gradient channel as it enters the Site to a sinuous, low-gradient channel flowing through a broad wetland. Long Meadow Pond Brook is contained in a channel approximately 15 to 20 feet in bankfull width. The stream had a nearly complete cover of ice on the date of the field review that prevented an assessment of instream habitat characteristics. Connecticut streams within similar settings as Long Meadow Pond Brook have a substrate composed of cobble, gravel, coarse sand, and sand-silt fines.

The wetland adjacent to the Long Meadow Pond Brook on the Site has been altered by past farming practices. Hay fields were developed to the top of bank with only sparse growths of hardwoods and woody shrubs remaining. The lack of riparian vegetation has lead to bank failure along a fairly significant length the brook. There were several debris jams of fallen vegetation.

The Department of Environmental Protection classifies the Long Meadow Pond Brook reach on the Site as *Class A* surface waters. Designated uses for surface water of this classification are potential drinking water supply, fish and wildlife habitat, recreational use, agricultural and industrial supply and other legitimate uses.

Aquatic Resources

The Inland Fisheries Division had conducted a fish survey of Long Meadow Pond Brook on only one occasion that being on June 20, 1991. The brook reach surveyed was approximately one mile downstream of the Site along Rubber Avenue. Brown trout, rainbow trout, blacknose dace, longnose dace, tessellated darter and white sucker were collected. The Long Meadow Pond Brook reach on the Site is anticipated to support a similar fish assemblage.

A section of Long Meadow Pond Brook immediately downstream of the Site along Rubber Avenue is accessible to anglers. The Inland Fisheries Division stocks approximately 400 hatchery-reared brown trout and rainbow trout annually at several locations along the three-quarter mile length of the brook.

Impacts

The proposed Long Meadow Brook Age Restricted Development is to consist of 21 lots and a community building. Two-unit dwellings (either townhouse or ranch design) will be constructed on each lot for a total of 42 residences. Two roads will provide access to the dwellings; one road will cross two unnamed watercourses.

Plot plans indicate there will be no alteration to the Long Meadow Pond Brook channel. However, the construction of homes and/or other change in the existing land characteristics on four of the 6 lots down-slope along the proposed western cul-de-sac can potentially impact the brook's riparian area and by association the brook itself. The four lots (the one ranch unit and the three consecutive townhouse units) are sited along a fairly steep slope and will require slope cut and fill for construction. The loss of well established vegetation and the exposure of soils areas of cut and fill raise concerns for sediment transport and deposition in the riparian corridor including wetlands. Significant sediment deposition may affect the vitality of the vegetation and lead to changes in the species composition.

A well vegetated, species diverse riparian area is critical to the health of the Long Meadow Pond Brook ecosystem. Roots of trees, shrubs, and grasses bind the brook bank soils and provide a resistance to the erosive forces of flowing water. Stems and leaves of brook bank vegetation provide shade that prevents high water temperatures. Leaves, stems, and other plant parts that fall into the brook provide food for aquatic insects. Large woody debris that fall into the brook enhance physical habitat. Abundant riparian vegetation

softens rainfall and enables the riparian area to serve as a reservoir storing surplus runoff for a gradual release to the brook during low flow periods of summer and early fall. The riparian area is a natural filter that removes nutrients, sediments, and other non-point source pollutants from overland runoff.

The main access road on the Site will be constructed atop an existing farm road. The farm road crosses two unnamed watercourses that are tributaries to Long Meadow Pond Brook. The existing road crossings are reported to be culvert pipes. Both watercourses were encapsulated by ice on the date of the field review that prevented an assessment of instream habitat characteristics and the degree to which the culverts may have measure of impairment caused by the culvert installation.

A representative of the Site developer intimated that the existing culverts would be replaced in-kind with construction of the access road. The in-kind culvert replacements can have the following adverse impacts to the habitats and resources the unnamed streams:

1. ***Create migration barriers.*** Culverts set atop the streambed along with rip rap scour protection placed in the stream channel are likely to create a barrier to the migration of fish and other obligate aquatic species. Excessive water velocities through the culverts during high stream flow events and sheet flow conditions during low flow events can cause a migration barrier. During low flow periods, stream flow is anticipated to percolate both through the rip rap scour protection rather than being maintained as surface flow which in turn will create a migration barrier.
2. ***Cause a decrease in stream productivity.*** The darkened condition through the culverts is anticipated to limit or prevent primary production (the growth of benthic algae) within the affected stream reach. A decrease or elimination of primary production in turn reduces the food supply available for aquatic insects and sequentially the amount of food available for resident fish proximate the culvert.

Recommendations

1. Eliminate four (the one ranch unit and the three consecutive townhouse units) of the 6 lots down-slope along the proposed western cul-de-sac.

2. Redesign the proposed access road culverts with the following modifications to assure that aquatic habitat and resource integrity is

maintained in the two unnamed streams:

- The invert of a box culvert should be embedded no less than 1 foot below the existing streambed elevation. The invert of a round culvert less than 10 feet in diameter should be embedded 1 to 2 feet below the existing streambed elevation. For round pipe greater than 10 feet in diameter, the culvert invert should be embedded one-fifth of the pipe diameter below the streambed elevation.
- The culverts should have a width that spans an area 1.2 times the bankfull width. In Connecticut streams, bankfull width equates to the channel width wetted at the 1.5 to 2 year frequency flow.
- The culverts should have an Openness Ratio of $\geq$ 0.25. The Openness Ratio (OR) is calculated by dividing a culvert's cross sectional area by its length.

$$\textbf{OR} = \frac{\textbf{[(cross-sectional culvert area pre-embedded) – embedded area]}}{\textbf{culvert length}}$$

- The culverts gradient should be no steeper than the streambed gradient up or downstream of the culvert.
- The culverts alignment should be similar to that of the stream and the culvert kept at a short a length as possible. Vertical headwalls rather than fill slopes should be installed at the culverts inlet and outlet to reduce the total culvert length.
- Corrugated metal culverts rather than concrete culverts are preferred. The corrugations create a roughness that aids in the retention of streambed material.
- Streambed material excavated for the culvert placements should be stockpiled and be replaced within the culverts following their installation. The streambed material should be replaced in a manner replicating the original stream cross section with a well-defined low flow channel contiguous with that existing in the stream.
- The placement of scour protection measures should be minimized to the fullest extent possible. Native stone should be utilized rather than quarried rip-rap.
- Retaining walls should be utilized in lieu of fill slopes along the access road approach to stream crossing structures to minimize riparian habitat loss.
- Unconfined instream activities associated with the culvert installations should be allowed only during the time period of June 1 through September 30.

3. Institute a phased development of the Site with an approved and completely functional stormwater management system installed initially.

4. Maintain a 100-foot wide riparian buffer along each side of Long Meadow Pond Brook on the Site. The riparian zone boundaries should be measured from either, (1) the edge of the riparian inland wetland as determined by Connecticut wetland soil delineation methods or (2) in the absence of a riparian wetland, the edge of the brook bank based on bankfull flow conditions. The riparian buffer should also be established on the five lots of the proposed Willow Ridge Subdivision that is to abut the Site westerly along Long Meadow Pond Brook.

5. The riparian buffer should be protected from future development by conservation easement or similar covenant. The boundary of the protected riparian buffer should be delineated with a barrier such as a low stonewall (that is passable to all wildlife species) or signage that is clearly visible. This should be an effective means to avoid encroachment by the property owner(s) and to aid Borough of Naugatuck staff in identifying and addressing violations of the protected riparian buffer.

6. Areas within the riparian buffer altered by prior land use should be reestablished to a condition similar to that found in undisturbed riparian buffer habitat. Vegetation selected for reestablishment within the riparian buffer shall be native and non-invasive.

7. Stormwater detention/retention basins should not be constructed within the riparian buffer.

8. Implement measures to control the bank erosion along Long Meadow Pond Brook. Bioengineered techniques rather than traditional hard armoring are preferred. A bioengineered technique consists of both a structural or mechanical element and vegetative elements working together to stabilize a site-specific condition. Structural components are employed to allow the establishment of vegetative elements while at the same time providing a level of protection for stability. The vegetative components are not just landscaping plantings for a structural project, but perform a functional role in preventing erosion by protecting the surface while also stabilizing soil by preventing shallow mass movements. The technique(s) should be designed to provide not only for bank stability but also for fish habitat enhancement. The Inland Fisheries Division can assist in selecting the most appropriate bioengineered technique(s) for Long Meadow Pond Brook.

Stormwater Management Review

Stormwater Permitting

Since the site construction involves the disturbance of over five acres, Connecticut's General Permit for the Discharge of Stormwater and Dewatering Wastewaters (the Permit) will cover the project. The permit requires that the site register with the Department of Environmental Protection (CTDEP) at least 30 days before the start of construction. The registrant must also prepare, submit and keep on site during the construction project a Stormwater Pollution Control Plan (the Plan).

Please note that this review is only specific to the plans for the age-restricted community. This review is based primarily on the state Permit, but many of the erosion and sedimentation issues are included in the Connecticut Guidelines for Soil Erosion and Sediment Control ("the guidelines"), and are issues that must be dealt with on a local level before being included in the Plan. It should also be noted that the permit requires compliance with the guidelines. The developer must register for the permit, and the contractor and any subcontractors involved in grading must sign the contractor certification statement in the permit. Any registration submitted by anyone other than the developer will be rejected.

The Plan must include a site map as described in Section 6(b)(6)(A) of the General Permit and a copy of the erosion and sedimentation (E & S) control plan for the site. The E & S plan that is approved by the Town may be included in the Plan. This plan and site map must include specifics on controls that will be used during each phase of construction. Specific site maps and controls must be described in the Plan, as well as construction details for each control used. The permit requires that "the plan shall ensure and demonstrate compliance with" the guidelines.

Due to the amount of soil disturbance, one of the best ways to minimize erosion potential is to phase construction in order to minimize unstable areas. The Plan must be flexible to account for adjustment of controls as necessary to meet field conditions. At a minimum, the plan must include interior controls appropriate to different phases of construction.

This project has steep slopes, a large amount of wetlands, very poorly drained soils, and sensitive surface waters that must be protected, which will makes weekly inspections and modifications to erosion controls an important part of this

project. The permit (Section 6(b)(6)(D)) requires inspections of all areas at least once every seven calendar days and after every storm of 0.1 inches or greater.

The plan must also allow for the inspector to require additional control measures if the inspection finds them necessary, and should note the qualifications of personnel doing the inspections. In addition, the plan must include monthly inspections of stabilized areas for at least three months following stabilization and the end of construction. Due to the scope and potential wetland and stream impacts of this project, there must be someone available to design and adjust E&S controls for changing site conditions, which has the authority and resources to ensure that such necessary changes are implemented. Particular attention must be paid to the construction in the area of the site with remediation issues. Wetlands are also an area of concern.

Soil type and the location of water table must be considered when cutting and filling of slopes during the construction process. Also, when the cutting and filling portion of the project is conducted please ensure that the tops of the slopes are stabilized with berms or other means that comply with the guidelines. The Department recommends erosion control matting for slopes greater than 3 to 1. Stockpiled soil should be staged in an area away from watercourses and wetlands. Stockpiled soil must be stabilized and if it remains disturbed but inactive for at least thirty days it must be temporarily seeding in accordance with the guidelines.

Structural practices including sedimentation basins are required for any discharge point that serves an area greater than 5 disturbed acres at one time. The basin must be designed in accordance with the guidelines and provide a minimum of 134 cubic yards of water storage per acre drained. At a minimum, for discharge points that serve an area with between 2 and 5 disturbed acres at one time, a sediment basin, sediment trap, or other control as may be defined in the guidelines for such drainage area, designed in accordance with the guidelines, shall be designed and installed. All sediment traps or basins shall provide a minimum of 134 cubic yards of water storage per acre drained and shall be maintained until final stabilization of the contributing area. Outlet structures from sedimentation basins shall not encroach upon a wetland. If a level spreader is used specific design criteria outlined in the guidelines must be followed. Level spreaders must be meticulously installed in order to work properly. Maintenance of all structural practices shall be performed in accordance with the guidelines, provided that if additional maintenance is required to protect the waters of the state from pollution, the Plan shall include a description of the procedures to maintain in good and effective operating conditions. The present locations of the basins are too close to wetlands and watercourses which could cause problems during the construction phase of the project.

Section 6(b)(6)(C)(ii) of the permit requires the plan to address dewatering wastewaters that this site may generate. Specific details for construction control during installation of any wetland crossings must be provided. A description of the operational and structural practices which will be used to ensure that all dewatering wastewaters will not cause scouring or erosion or contains suspended solids in amounts which could reasonably be expected to cause pollution of waters of the State. Dewatering wastewaters shall be discharged in a manner, which minimizes the discoloration of the receiving waters.

Particular attention must be paid to the areas during construction that will drain towards Long Meadow Pond Brook, and the intermittent watercourse(s).

Post-construction Stormwater Treatment

Stormwater Quality Manual should be consulted when designing stormwater treatment systems. The permit (Section 6(b)(6)(C)(iii)) requires that the plan include a design for post-construction stormwater treatment of 80% of total suspended solids from the completed site. In order to comply with this requirement, the Department of Environmental Protection Stormwater Unit recommends incorporating swirl concentrator technology. Although, swirl concentrators are effective at removing sediment, they require a long-term maintenance commitment from the town or a homeowners association greater than that required for a basin once it is fully grown-in and stabilized. If an in-ground, "black-box" solution is used, swirl-concentrator technology is a minimum requirement. Some newer generation swirl concentrators also incorporate filtration systems to address other pollutant issues, but these also require long-term maintenance plans.

Other Issues

During the tour of the site, a fill pipe for an underground storage tank was observed. This should be fully investigated and addressed before construction begins

Another area of concern is stockpiled fill material. This area has been evaluated by Delta Environmental Services and also should be addressed before construction begins.

When designing this project engineers should evaluate low impact development practices.

This report addresses some of the major issues concerning the project and does not constitute a complete review of the Plans for permitting purposes.

Rubber Waste Fill

The environmental investigation this reviewer reviewed focused exclusively on the area of the rubber waste fill in the western part of the site. However, additional investigation of the rest of the site should be conducted. Possible areas of concern to be investigated might include the former nursery operations, especially in the former heating system for the greenhouses; previous pesticide usage at the nursery and any areas of waste disposal (several areas of surficial waste disposal other than the rubber waste fill were observe during the field review). Investigation should include interviewing former nursery personnel to determine how the heating system worked and how pesticides were used and handled, and collecting soil and groundwater samples from any areas of concern identified. Fill pipes for several possible underground storage tanks were observed in the area downhill from the parking lot, as well as at least one aboveground tank in one of the outlying greenhouses.

Removal of the rubber waste is already proposed. A remedial action plan should be prepared for removing this material. The details provided on the Construction details drawing are not sufficient for this purpose. This drawing appears to require the town to determine that the fill has been removed. The fill removal should be overseen by an environmental professional, and the removal should be confirmed by sampling the soil remaining beneath the waste to demonstrate that contamination has been removed. Groundwater samples should also be collected to determine if any contaminants in the waste have impacted groundwater, and to confirm that any remediation was effective. Any water pumped to the dewatering sump during remediation should be tested before it is discharged (dewatering as part of remediation may also require registering for a general permit). Confirmation sampling should also be conducted after any other waste is removed if the waste might have impacted soil or groundwater (such as a drum, a tank or a vehicle).

Planning Considerations

Overview

Long Meadow Brook, LLC, proposes to build 42 units of age-restricted (55 and older), housing on 27 acres located on the western side of Naugatuck near the Middlebury town line. The land is zoned for industrial use (I-2). The site has public water and sewer.

State Plan

The development is being proposed in a portion of Naugatuck identified as a growth area in the *State Plan of Conservation and Development* (2005). Therefore, development is in conformity with the *State Plan*.

Regional Plan

This portion of Naugatuck along Long Meadow Brook is identified as a "rural area" in the *Regional Plan of Conservation and Development* (1998). The *Regional Plan* recommends preserving the "rural character" of rural areas and that "any development should respect natural resource and environmental constraints." According to the *Regional Plan*'s Natural Resource Constraints Map (see attached), approximately two-fifths of the proposed site is classified as having prohibitive natural resource constraints, primarily due to wetlands. The *Regional Plan* recommends that no development take place in areas of prohibitive natural resource constraints.

According to the proposed site plan, none of the housing units being proposed would be in the prohibitive wetlands / flood plain area. Since the site is to have sewer and water service, the *Regional Plan* recommends a maximum lot size of between ½ and 1 acre, or a minimum density of between 1 and 2 dwelling units per acre. The proposed development would exceed the recommended minimum development density (approx. 2.6 dwelling units per buildable acre) and be in conformity with the *Regional Plan*.

Borough Plan

The Borough of Naugatuck's 2001 *Plan of Conservation and Development* identifies the area of the Long Meadow Brook proposal to be in a "New Subdivision Management" area. According to the *Borough Plan*, subdivisions in new

subdivision management areas should be restricted to lots of three-quarters of an acre or *larger* when served by public sewer and public water. Excluding prohibitive wetlands areas the development density being proposed is approximately twice that allowed in the *Borough Plan*. Including the prohibitive wetland areas, the development density is 1.5 dwelling units per acre, still exceeding the maximum of 1.3 dwelling units per acre in allowed in the *Borough Plan*. Due to the density of development proposed, the Long Meadow Brook Age Restricted Development is not in conformity with the *Borough Plan*.

Zoning

The site of the proposed Long Meadow Brook Project is zoned for industrial uses (I-2) and does not allow age-restricted housing. The site will need to be rezoned for the age restricted housing proposal to move forward. At one time this industrially zoned site was one of only a few sites in the Borough of Naugatuck where adult-oriented businesses could be legally located due to setback distances required in the borough ordinance. There is the risk that the elimination of the I-2 zone, as proposed in this project, could constitute the illegal prohibition of legal adult-oriented businesses in the Borough of Naugatuck.

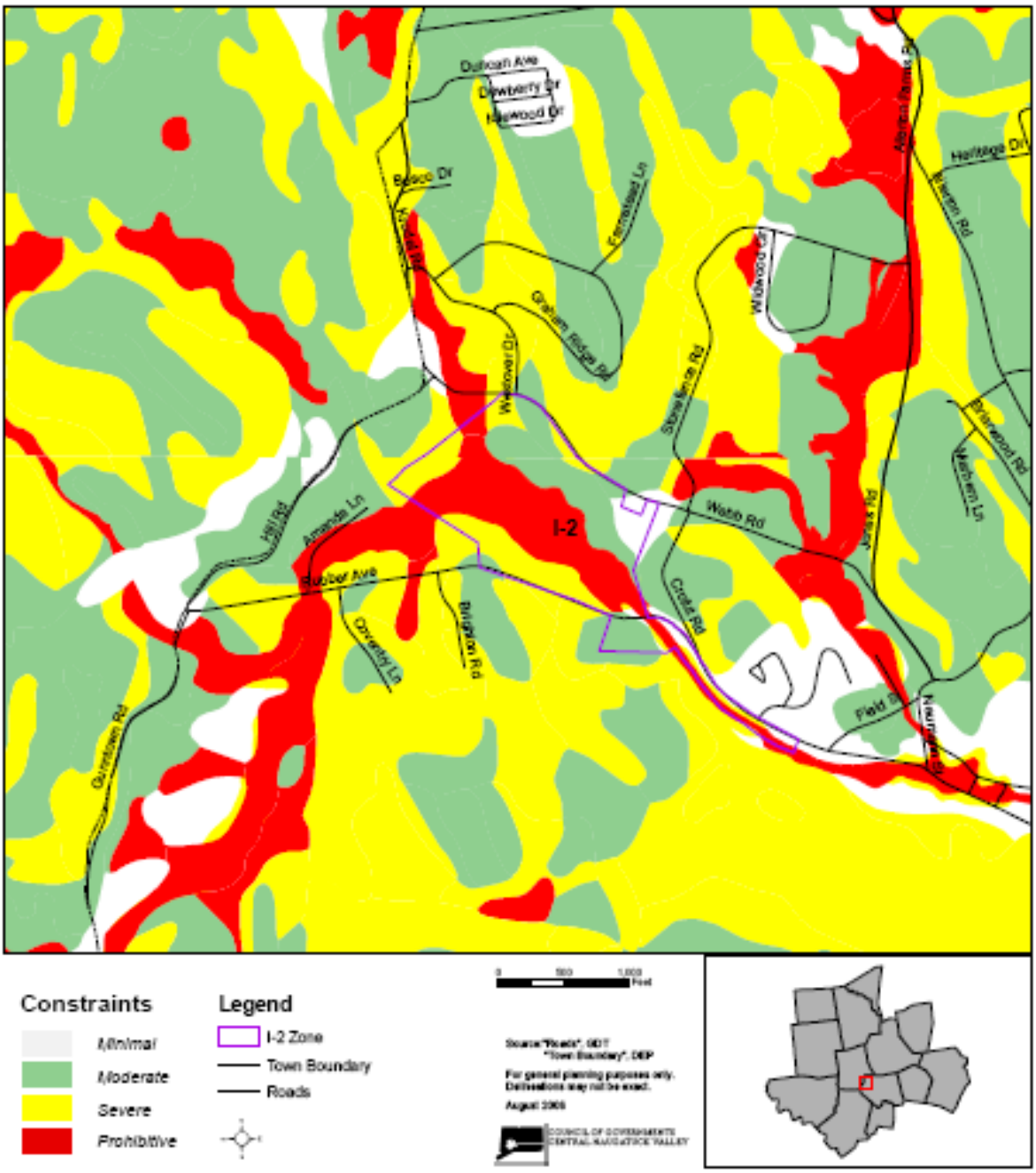
Transportation

Long Meadow Brook, LLC, proposes to build two connecting roads off Webb Road for the development. According to the proposal, the roads will cross wetlands twice and there will be two connections to Webb Road. Given the short length of the proposed roads (1,110' and 1,920') and the two entrances and exits, there should be adequate emergency vehicle access.

Age-restricted housing is likely to generate les traffic than traditional single family housing. According to a case study in the February 2007 issue of the ITE (Institute of Traffic Engineers) Journal, a 460 unit age restricted development in Virginia generated 0.18 vehicle trips per dwelling unit during the p.m. peak commute hour and 0.33 vehicle trips per dwelling unit during the p.m. peak commute hour. If these results are applicable to Long Meadow Brook, approximately 8 new vehicle trips would be added to Webb Road during the p.m. peak commute hour and 14 new trips during the p.m. peak commute hour.

Natural Resource Constraints

Long Meadow Brook, Naugatuck



Archaeological and Historical Review

The Office of State Archaeology (OSA) and the State Historic Preservation Office (SHPO) believe that the proposed project area possesses a high sensitivity for archaeological resources, especially in the western portion of the property adjacent to Meadow Pond Brook. This review is based on known prehistoric Native American sites in the State of Connecticut's archaeological site files and maps, and topographic and environmental characteristics of the land. Native American sites have been located in the immediate proximity of the project area. These sites include hunting and gathering camps dating to over 4,000 years ago. The project area also suggests a high probability for undiscovered archaeological resources. Eastern portions of the project area appear disturbed and do not possess any archaeological concerns.

Both the OSA and SHPO concur in the need for a professional reconnaissance survey that should be undertaken in order to locate, identify and evaluate all archaeological resources that may exist within the ERT study area. A reconnaissance survey would provide the Town of Naugatuck, OSA and the SHPO with important cultural resource information for assisting in the local decision-making processes. All archaeological investigations should be carried out pursuant to SHPO's *Environmental Review Primer for Connecticut's Archaeological Resources.*

The OSA and SHPO offices are available to provide technical assistance to the applicant and the Town of Naugatuck in conducting the recommended survey. A list of qualified archaeological consultants can be forwarded.

The Natural Diversity Data Base

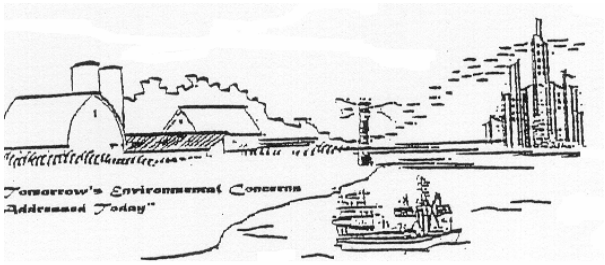
The Natural Diversity Data Base maps and files for the project site have been reviewed. According to our information, there are no known extant populations of Federal or State Endangered, Threatened or Special Concern Species at the site in question.

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

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

Appendix

Report from the Southwest Conservation District dated 10/13/06.



Southwest Conservation District

North Farms Executive Park
900 Northrop Rd., Suite A, Wallingford, CT 06492
(203) 269-7509 Fax 294-9741
E-mail swcd43@sbcglobal.net
Website www.conservect.org

Borough of Naugatuck 10-13-06
Planning & Zoning Commission
229 Church Street
Naugatuck, CT 06770

Materials Reviewed:

- Site Plan Drawings for Long Meadow Brook PPD, Webb Road & Rubber Ave., Naugatuck, CT from NOK & Assoc., Shelton, CT. Sheets 1-15. Dated: June 12, 2006.

- Site Plan Drawings for Willow Ride, Rubber Ave., Naugatuck, CT from NOK & Assoc., Shelton, CT. Sheets 1-9. Dated: June 12, 2006. Revised 06-20-06.

- Engineering Report, Long Meadow Brook LLC, Webb Road, Naugatuck, CT, by NOK Assoc., Dated: March 24, 2006.

Dear Mr. McCreary,

In response to your request for assistance, the District conducted a site visit on 10/10/06 and the review of the aforementioned documents for a proposed PPD on Webb Road & Rubber Ave., Naugatuck, CT. The following observations, comments and recommendations are offered. These recommendations are advisory in nature and are intended to assist The Borough's Commissions manage their natural resources while preserving and protecting water quality of the Naugatuck River Watershed and the Waters of the State.

Soils Resources

The historical reference for soils regarding this region can be found in sheet number 18 of the 1979 New Haven County Survey.

Exhibit #1 (CT Soils Mapping) is derived from the new digital survey (Soil Survey of Connecticut). The soil survey utilizes recent aerial photographic base with one soil legend, which employs the numbering convention used by the USDA.

Mapping Units
Wetland Soils – Exhibit #1

1) **Map Unit Ro – Rippowam (formerly named Rumney - Ru) – USDA Soil # 103**
   These soils are very deep and poorly drained. They formed in alluvial sediments. Typically, these soils have fine sandy loam textures overlying stratified sand and gravel to a depth of 60 inches or more. Rippowam soils are subject to flooding and typically flood annually, usually in the spring.

This soil constitutes 36% of the total soils in this region and is found along the Long Meadow Brook Corridor between Rubber Ave. and Webb Rd. The composition and profile of this soil creates an unconsolidated aquifer that is capable of yielding moderate to very large amounts of water (50 – 2000 gallons per minute) to individual wells.

Concerns

Streambank Stabilization – Increased, direct runoff discharges to tributaries and the river from development have increased velocities and volume, which entrain and transport solids and organic materials. Evidence of eroding banks have introduced sediments downstream, advances the aggrading of the stream, which causes the river to go out of bank more often.

Aquifer Protection – Consideration should be given to potential high yield areas for preservation and protection for municipal and private consumption. **See Exhibit #2, "Ground-water Availability in CT".**

Residential Development Threat to Water Quality– Sprawl from residential development, their associated manicured landscapes, impervious surfaces and stormwater infrastructures are introducing excessive amounts of nutrients and pesticides into surface waterbodies, watercourses and ground water.

2) **Map Unit RN – Ridgebury, Leicester and Whitman extremely stony fine sandy loams. USDA Soil #3** Consists of nearly level to gently sloping, poorly drained soils in drainageways and depressions on glacial uplands. Ridgebury soils are very deep and derived mainly from gneiss and schist. Typically, they have a friable loam or fine sandy loam surface layer and subsoil over a firm fine sandy loam or sandy loam dense till substratum. Ridgebury soils have a perched watertable within 1.5 feet of the surface much of the year.

   This soil constitutes 4.7% of the total soils. This soil type develops in the drainageways, which act as a conduit to the Long Meadow Pond Brook hydrologic unit 6917 of the Naugatuck River Basin #6900.

Concerns

Land Use - these wetlands have been encroached upon by agricultural influences and residential development, which has filled and utilized them as environmental sinks to perform convenient stormwater conveyance, served as raw-water renovation and have been the recipient of an array of NPS pollutants directly related to land use.

Loss of Wetlands - The interruption of drainage patterns due to the proximity of proposed roadways, dwellings and their expansive landscapes may have an adverse impact to water quality and wildlife dependent on these wetlands.

- Further bisecting and siting of impervious surface through these wetlands will alter the existing hydrology of the larger RO (Rippowam) wetlands along with the water quality of Long Meadow Brook.

- Siting Detention Basin #1 and allowing construction activity well within the wetland buffer will disturb highly erosive soils, destroy upland habitat and pose an increased risk of impact to the down slope wetlands and disrupt wildlife corridors.

Marginal Land Use - The limitations imposed by these wetland soils and the physical attributes associated with the upland soils should require a higher level of scrutiny by Naugatuck's Inland Wetlands Commission, Health Dept. and their Planning & Zoning Commissions.

Buffering of Wetlands – Most of the upland soils in close proximity to these wetlands have **moderate to severe erosion hazards** that relate to their composition and their topographic relief. * Utilize the CT DEP 100' Upland Review area to reduce encroachment and minimize risks to the environment.

Wetland Mitigation

a) The proposed crossings alter the hydrologic regime and convey natural drainage runoff to the southeast corner of the site.

- Employing larger open-bottom culverts, arches or bridges that reduce the filling of the wetlands and allows for easier translation of surface water runoff and movement of all wildlife should modify crossings. See page 57 of the CT DEP Inland Wetland Commissioner's Guide to Site Plan Review.

- Disturbing a wetland area on 1:1 ratio of loss in an area that is stable and functional is self-defeating and posses an unnecessary disturbance of terrestrial and aquatic habitat. Consider relocating Detention Basin #1 away from the wetlands and converting the basins to multi-cell basins that perform a higher level of treatment with greater time of travel within the basin and utilize hydrophytic plants that facilitate raw water renovation.

Non-wetland Soils

3) CfC – Charlton fine sandy loam, 8 to 15 percent slopes. USDA Soil # 60C

Located on the sides of hills and ridges and at the foot slopes of steep hills that have been influenced by underlying bedrock. This soil has a **poor potential for community development**. It is limited mainly by steepness of slopes The steepness of slopes causes additional expense in building structures, roads and the installation of water and sewer lines. This soil is fairly easy to excavate, but it commonly contains stones and boulders.

This soil has a **severe erosion hazard**. Permeability is moderate to moderately rapid. Runoff is rapid. Intensive conservation measures are needed to prevent excessive runoff, erosion and siltation during construction projects.

4) CrC – Charlton-Hollis soil 3 to 15 percent slpoes. USDA Soil #73C.

This complex consists of well drained soils located on uplands where the relief is affected by underlying bedrock. The Charlton component has moderate or moderately rapid permeability. Runoff is medium to rapid. The Hollis component has moderate to moderately rapid permeability above the bedrock.

This complex has **fair to poor potential** for community development. **The Charlton component has fair potential** for development and the **Hollis has poor potential** for development due to its shallowness to bedrock.

Intensive enhanced conservation measures such as temporary vegetation and siltation basins are frequently needed to prevent excessive runoff, erosion and siltation.

Concerns

The included Paxton and Hollis soils are even less suitable for development:

- Paxton soils have slow permeability in the substratum. A dense lense of Paxton soils within the Charlton soil can cause down slope seeps and affect the structural integrity of proposed service infrastructures and dwellings.

- Hollis soils are limited by their shallowness to bedrock, which is approx. 10 to 20 inches in depth.

- The fine particulates of schist and gneiss associated with these soils stay in suspension for extended periods. This characteristic demands adequately sized temporary and permanent sedimentation basins to assure runoff pretreatment and minimize the potential for transport of solids and turbid water off-site.

5) HpE – Hollis-Charlton-Rock Outcrop complex, 15 to 35 percent slopes. USDA Soil #73E

This complex has a **poor potential for development**. One soil is named Hollis. Hollis soils are shallow and well drained. They have fine sandy loam textures overlying consolidated bedrock at a depth of 10 – 20 inches. The other soil is named Charlton. Charlton soils are very deep well drained soils formed in loose glacial till. Typically, they have fine sandy loam textures to a depth of 60 inches or more.

The rock outcrop consists of exposures of crystalline bedrock located on knobs and ledges. The Hollis soil dominates the area, followed by the Charlton and rock outcrop components. **Runoff is rapid** in both the Hollis and Charlton type soils. Both are limited by steepness of slopes and shallowness to bedrock, rock outcrops and stoniness. **There is a hazard of effluent seeping into cracks in the bedrock and polluting groundwater.**

These highly erodable slopes must employ intensive conservation measures such as the use of diversions, vegetative cover, mulching and siltation basins, which are needed to prevent excessive runoff, erosion and siltation.

6) HkC – Hinckley gravelly sandy loam, 8 to 15 percent slopes. USDA Soil #38C.

These very deep excessively drained soils formed in sandy and gravelly glacial fluvial deposits derived mainly from granite, gneiss or schist. Typically, Hinckley soils have a gravelly sandy loam or gravelly fine sandy loam surface layer over a stratified gravelly to extremely gravelly loamy sand-to-sand subsoil and substratum. The substratum extends to a depth of 60 inches or more.

Siting Concern

- **All of the aforementioned non-wetland soils (3-6) are easily suspended and transported by surface runoff. The minimization of land disturbance, avoiding or limiting exposure of steep slopes is important during all phases of construction.**

7) Map Unit Nn – Ninegret fine sandy loam. USDA Soil #21A

These soils are very deep and moderately well drained. Ninegret soils formed in glacial outwash. Typically, they have a fine sandy loam surface and subsoil layer, overlying sand and

gravel to a depth of 60 inches or more. They exhibit redoxamorphic features within a depth of 24 inches. These soils have a seasonally high watertable at 1.5 to 2.5 feet from late fall to early spring.

The soil has **poor to fair potential** for community development. Permeability is moderately rapid in the surface layer and subsoil and rapid in the substratum.

Concerns:

- Foundations and basements need to be properly designed and constructed to insure a stable foundation and prevent wet basements.

- Normal landscaping fertilization and pest control applications has the potential to pollute ground water.

8) Map Unit PbC – Paxton fine sandy loam, 8-15 percent slopes. USDA Soil # 84C
Map Unit PbD – Paxton fine sandy loam, 15-25 percent slopes. USDA Soil # 84D

This PbB map unit consists primarily of Paxton soils that are very deep, well drained soils formed in compact glacial till, derived mainly from gneiss and schist. Typically, they have a friable fine sandy loam or loam surface layer and subsoil over a firm fine sandy loam or sandy loam dense till substratum. Commonly referred to as hardpan.

This soil has **fair potential** for community development. Permeability is moderate in the surface layer and subsoil and slow in the substratum. It is limited mainly by the slowly permeable substratum and the steepness of slopes. **Runoff is rapid**. **Erosion hazard is severe** and fairly intensive conservation measures are needed to prevent excessive runoff, erosion and siltation during periods of construction.

"D" Slope Designations

- These soils have a poor potential for development as steeper slopes increase the erosion hazard and dense subsoil layers perch watertables, which form mid-slope seeps.

- Careful design and installation of footing drains are needed to insure the integrity of the structures basement and utilities.

- The majority of these soils occur in the northeastern portion of this site, which has a majority of proposed dwellings and related infrastructure.

9) Map Unit SvB - Sutton fine sandy loam, 3 to 8 percent slopes. USDA Soil # 50B

These soils are very deep and moderately well-drained. Typically, Sutton soils have fine sandy loam textures to a depth of 60 inches or more. Depths to the seasonally high watertable range from 1.5 to 2.5 feet during the months of November through April. Redoxamorphic features occur within a depth of 24 inches. This soil is a very minor component on this parcels landscape.

10) Map Unit WxA – Woodbridge fine sandy loam, 3 to 8 percent slopes. USDA Soil #45B

This nearly level, moderately well drained soil is on the top of drumlins and in slight depressions on hill and ridges of glacial uplands. Woodbridge soils are very deep, moderately well drained soils that formed in compact glacial till, derived mainly from gneiss and schist.

Typically, they have a friable fine sandy loam or loam surface layer and subsoil over a firm fine sandy loam or sandy loam dense till substratum. Woodbridge soils have a perched seasonal watertable at 1.5 to 2.5 feet from late fall to early spring.

Permeability is moderate in the surface layer and subsoil and slow in the substratum. Runoff is slow. This soil has fair potential for development. **It is limited mainly by the seasonally high watertable and its slowly permeable substratum.** This soil is subject to ponding at times.

During construction conservation measures are needed to prevent excessive runoff, erosion and siltation.

Concerns

- The Willow Ridge component of this proposal sites individual houses with basements atop of these soil types. See Ratings on Dwellings with Basements provided in Exhibit #3 &4.

- Regions with fractured or faulted bedrock are particularly susceptible to ground water contamination because percolating water moves rapidly downward and horizontally through cracks and fissures in the rock with little chance for infiltration. Highly permeable subsoil materials allow water and dissolved pollutants to freely percolate downward to the groundwater. The shallower the depth to groundwater, the less filtering action of the soil and the fewer the opportunities for degradation or absorption of pollutants.

- This type of proposed intense activity is sited in the recharge and state aquifer region, which is delineated by the Ground-water Yields for Selected Stratified-Drift Areas in CT by D. Mazzeferro in 1986. (See mapping provided) **Section 22a-354i-9. Best Management Practices for Regulated Activities.** The Borough of Naugatuck should investigate the siting of this type of proposed activity relative to the **Aquifer Protection Area Program (C.G.S. 22a-354a et. Sec.),** The program is designed to identify critical water supply areas and protect them from pollution by managing land use. The Aquifer Protection Areas includes the well field and areas of contribution and recharge. Areas have been mapped for existing wells and for "approved" future wells.

Siting Concerns

1) Proposed Phase I disturbs steep highly erodable soils and sites dwellings, roadways, stormwater detention basin #1 plus their support infrastructure atop of soils that are easily detached, entrained and suspended in solution for long periods of time once they are denuded.

2) At three locations along the north side of the Phase II roadway it seems as if the wetlands will discharge into the stormwater infrastructure and be conveyed to Sedimentation Basin #2. This affectively starts to dewater the wetlands and alters the hydrologic regime and inflow to the larger wetlands and watercourse to the south. Was this created to respond to the potential impoundment caused by the roadway and the alteration of the natural drainage pattern?

    - Check the invert and outlet elevation of the catch basins along with their support structures.

Sediment & Erosion Control

Detention Basin - The Soil and Erosion Control Plan for Phase 1 shows a temporary sedimentation basin, which outlets to an armored overflow. This facility would not allow enough time of travel for adequate settling of the suspended materials from this type of soil.

- Soils with these attributes in very close proximity to wetlands and watercourse should not be developed, because of their potential to impact down slope environments.

- Eliminate Phase I to reduce impervious surface, altering recharge, drainage patterns and the Non-point Source contaminant footprint.

SWPPP – Phase II Stormwater Pollution Prevention Plan

- Drawing details and locations of equipment staging, refueling and hazardous materials storage with 125% spill containment capabilities need to be addressed in the Phase II requirement.

Note:

The subsoil and substratum of these soils are very permeable. They will act as a direct conduit for any contaminants that have the potential to adversely affect water quality in groundwater and adjacent watercourses.

Construction Sequence

- The timing of the revegetation of these slopes is critical. These soils are **extremely droughty and have a severe erosion hazard** associated with their disturbance. These soils do not have a deep surface layer that can be stockpiled and readily applied to final grades. **Temporary mulching of all disturbed or exposed soils should be implemented.**

CE - Construction Entrance -

- The minimum length of the construction entrance should be 75' due to the silt loam composition of the Hinckley soil. See attached **Construction Entrance (CE) measure on pages 5-12-3 & 4 regarding length of measure.**

Note: See maintenance guidance on construction entrance provided. Due to the composition of these soils, mechanical sweeping may be necessary on a daily basis.

Soil Stockpiles

- Locate stockpiles on field of drawing with adequate E&S controls at toe of slope. **See measure GSF on page 5-11-38**
- Soil Stockpiles unused and exceeding 30 days should be stabilized with vegetated cover. **See section 4-9**.

Note:

Topsoiling will require a minimum depth of 4" to 6" of suitable growing medium. Unfortunately, any landscaping will be highly dependent on irrigation due to the parent material, which is excessively well drained on site. Consideration should be given to alternate landscaping that does not include a conventional lawn. Alternative landscaping would also reduce the use of fertilizers and pesticides.

Clearing and Grubbing

- Disposal of stumps and cleared materials. Chipping of these materials and reuse for temporary erosion control and mulching should be considered.

Slope Stabilization

- Slopes 2:1 and steeper with soil characteristics such as this should be stabilized with erosion control blankets or suitable hydro seeding with a soil tactifier. The utilization of bioengineering products can provide immediate stabilization of slopes, which also promote quicker germination of seeds to establish vegetative cover. **See section on use and installation of Erosion Control Blankets (ECB) pages 5-4-10 & 11**

  Note: The use of erosion mats will require longer stapling pins to secure into these fine sandy loams.

RW – Retaining Wall

- A retaining wall is an engineered measure that requires a design by a certified engineer and its related details shown on the field of the drawing. **See section on Retaining Wall Structures (RW) pages 5-5-3 & 4 plus 5-5-6 & 7.**

Stormwater Management

- **Detention Basin – Section 11-P2-1 thru P2-8, 2004 CT Stormwater Quality Manual.** Re-design and relocate detention Basin to increase time of travel and retention with a multi-cell design. Enhance basin with hydrophytic plants for nutrient uptake, which provides greater opportunity for raw water renovation prior to discharge.

- Provisions for access roads to or into these proposed basins need to be incorporated into the drawing to ensure proper maintenance of these facilities.

- The developer uses standard catch basins with 2' deep sumps throughout the stormwater infrastructure. There is no opportunity to sequester solids and floatables prior to entering the proposed basins. The catch basins prior to the discharge points should be reconfigured to have a 4' minimum sump with hooded outlets.

Test Pit Data

Delta Environmental Report dated Feb. 28, 2005 – Re: Environmental Investigation
Only half of test pit locations appear on a map in the engineering report TP's 1-8. All Test Pit / Boring data locations should be on the field of the site plan drawings along with an overlay of all soil types relative to the proposed development or land use activity.

Concerns

Laboratory analysis confirmed the existence of Volatile Organic Compounds (VOC's) and Heavy Metals. While the contaminant levels demonstrate low levels, the locations where these compounds were found should be carefully considered to limit any disturbance, community development of or exposure of these components. Once exposed to the air, these compounds gas off to the environment and present themselves as a vapor, which can concentrate in confined areas or be inhaled by all life forms.

Siting of public or private structures atop of these soils with these types of contaminants requires complete disclosure and monitoring to reduce any potential health risk. Dwellings with basements in the locations should come under greater scrutiny and long-term detection should be a condition set forth in any project of this type. Frankly, exposing any portion of the community to these types of contaminants should not be entertained unless the remediation process was highly successful in dramatically reducing or eliminating the threat.

It would be prudent for the Borough to contact CT DEP, Permitting, Enforcement and Remediation Division at 860-424-3018 if it hasn't already done so.

Wildlife on site

Habitat Protection – According to the material presented to the District, no environmental study regarding terrestrial or aquatic habitats was conducted on this site. Qualifying and quantifying the wetland and habitat value in this riverine corridor along with its sizable wetlands would be prudent. Potential breeding habitats should have been investigated and ranked.

In an effort to obtain an unbiased assessment regarding habitat for this parcel, I recommend that the Commission contact Peter Picone of the DEP Wildlife Division to investigate the mid and upslope environment. I suggest this because the area may have a suitable ecosystem to support the Eastern Box Turtle and serve as a refuge for a variety of birds and wildlife.

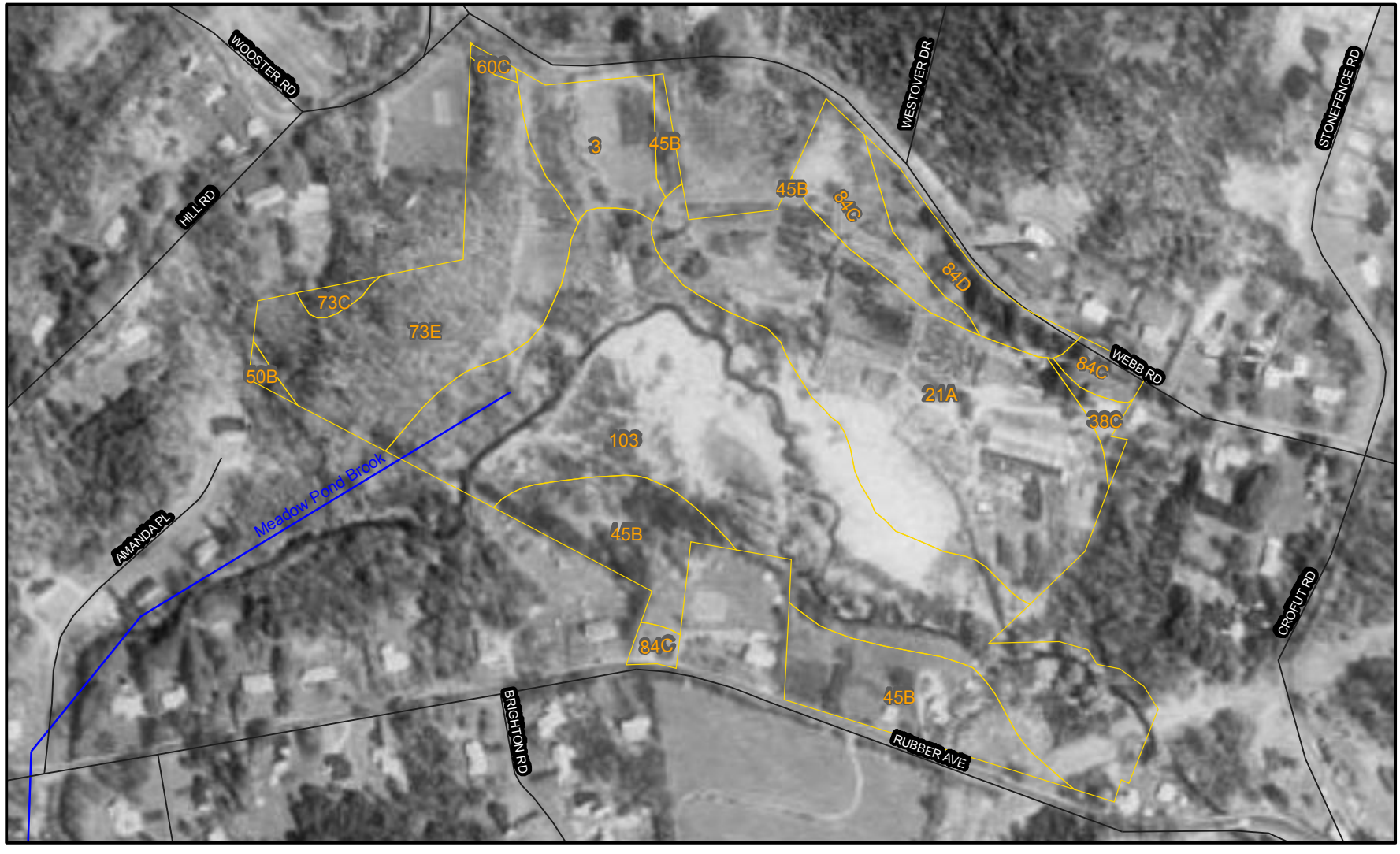
Should you or your Commission require any additional information please contact the District office.

Sincerely,

Roman S. Mrozinski, Executive Director
Southwest Conservation District

SOIL SURVEY OF STATE OF CONNECTICUT

102k6NaugLngMeadow



Meters
0 40 80 160

Feet
0 100 200 400 600 800

102k6NaugLngMeadow

MAP LEGEND

- Soil Map Units
- Interstate Highways
- Roads
- Rails
- Water
- Hydrography
- Oceans
- Escarpment, bedrock
- Escarpment, non-bedrock
- Gulley
- Levee
- Slope
- Blowout
- Borrow Pit
- Clay Spot
- Depression, closed
- Eroded Spot
- Gravel Pit
- Gravelly Spot
- Gulley
- Lava Flow
- Landfill
- Marsh or Swamp
- Miscellaneous Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Slide or Slip
- Sinkhole
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Perennial Water
- Wet Spot

MAP INFORMATION

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov

Coordinate System: UTM Zone 18

Soil Survey Area: State of Connecticut
Spatial Version of Data: 3
Soil Map Compilation Scale: 1:12000

Map comprised of aerial images photographed on these dates:
4/3/1991; 4/12/1991

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

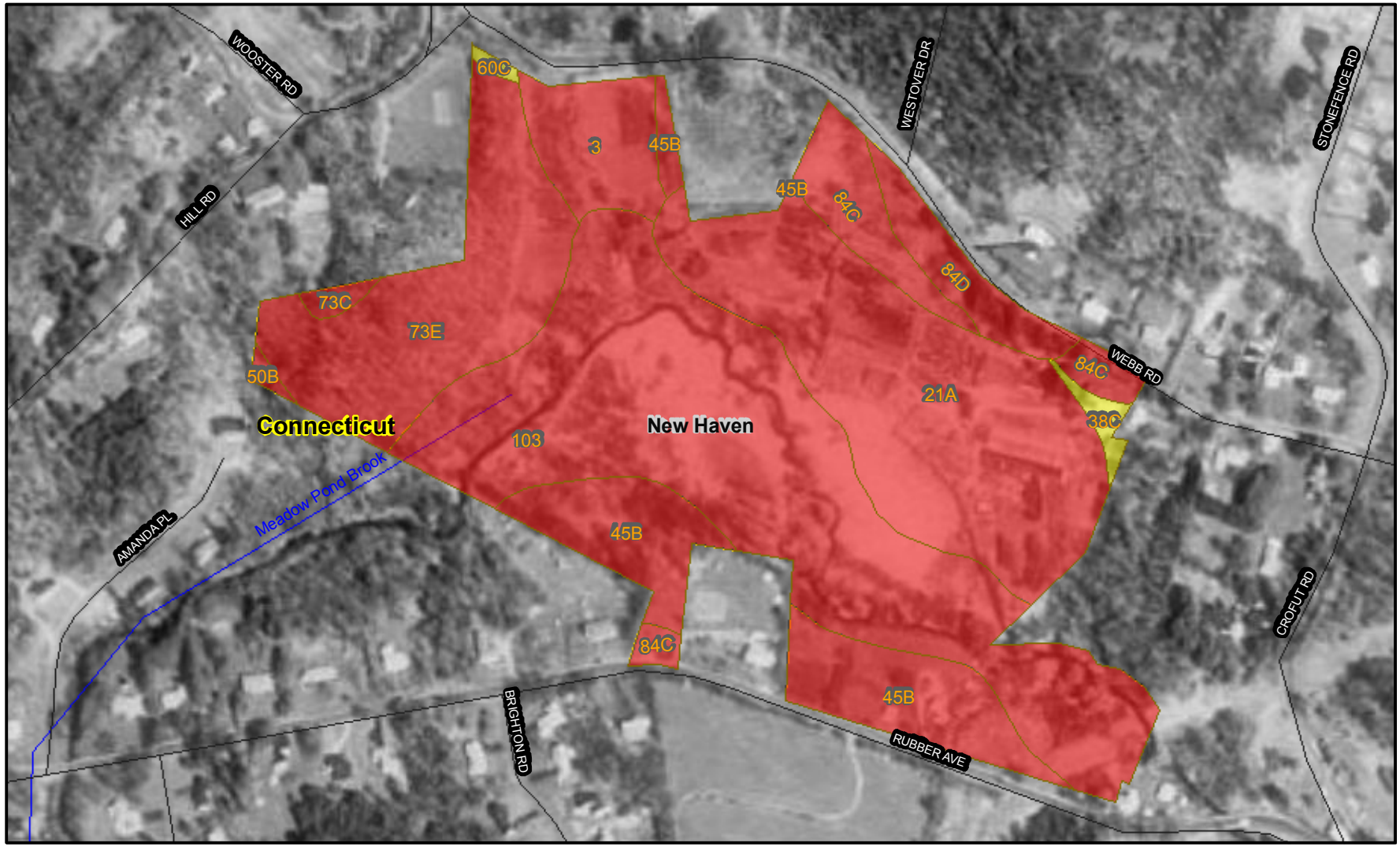
Map Unit Legend Summary

State of Connecticut

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3	Ridgebury, Leicester, and Whitman soils, extremely stony	1.8	4.7
21A	Ninigret and Tisbury soils, 0 to 5 percent slopes	8.8	23.5
38C	Hinckley gravelly sandy loam, 3 to 15 percent slopes	0.3	0.7
45B	Woodbridge fine sandy loam, 3 to 8 percent slopes	4.3	11.5
50B	Sutton fine sandy loam, 3 to 8 percent slopes	0.1	0.3
60C	Canton and Charlton soils, 8 to 15 percent slopes	0.1	0.2
73C	Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky	0.2	0.5
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	5.3	14.2
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes	1.9	5.1
84D	Paxton and Montauk fine sandy loams, 15 to 25 percent slopes	1.2	3.2
103	Rippowam fine sandy loam	13.5	36.1

DWELLINGS WITH BASEMENTS RATING FOR STATE OF CONNECTICUT

102k6NaugLngMeadowLimitationsBasement



Meters
0 40 80 160

Feet
0 100 200 400 600 800

102k6NaugLngMeadowLimitationsBasement

MAP LEGEND

Dwellings With Basements

{Dominant Condition, >}

- Very limited
- Somewhat limited
- Not limited
- Not rated or not available
- Soil Map Units
- Cities
- Detailed Counties
- Detailed States
- Interstate Highways
- Roads
- Rails
- Water
- Hydrography
- Oceans

MAP INFORMATION

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov

Coordinate System: UTM Zone 18

Soil Survey Area: State of Connecticut
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4/3/1991; 4/12/1991

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Tables - Dwellings With Basements

Summary by Map Unit - State of Connecticut

Soil Survey Area Map Unit Symbol	Map Unit Name	Rating	Component Name (Percent)	Rating Reasons	Total Acres in AOI	Percent of AOI
3	Ridgebury, Leicester, and Whitman soils, extremely stony	Very limited	Ridgebury (40%)	Depth to saturated zone	1.8	4.7
			Leicester (35%)	Depth to saturated zone		
			Whitman (15%)	Ponding		
				Depth to saturated zone		
			Sutton (2%)	Depth to saturated zone		
			Woodbridge (2%)	Depth to saturated zone		
21A	Ninigret and Tisbury soils, 0 to 5 percent slopes	Very limited	Ninigret (60%)	Depth to saturated zone	8.8	23.5
			Tisbury (25%)	Depth to saturated zone		
			Sudbury (2%)	Depth to saturated zone		
			Raypol (1%)	Depth to saturated zone		
			Walpole (1%)	Depth to saturated zone		
38C	Hinckley gravelly sandy loam, 3 to 15 percent slopes	Somewhat limited	Hinckley (80%)	Slope	0.3	0.7
			Merrimac (5%)	Slope		
			Windsor (5%)	Slope		
			Agawam (3%)	Slope		

Summary by Map Unit - State of Connecticut

Soil Survey Area Map Unit Symbol	Map Unit Name	Rating	Component Name (Percent)	Rating Reasons	Total Acres in AOI	Percent of AOI
45B	Woodbridge fine sandy loam, 3 to 8 percent slopes	Very limited	Woodbridge (80%)	Depth to saturated zone	4.3	11.5
			Paxton (5%)	Depth to saturated zone		
			Montauk (3%)	Depth to saturated zone		
			Ridgebury (3%)	Depth to saturated zone		
			Sutton (2%)	Depth to saturated zone		
			Leicester (2%)	Depth to saturated zone		
			Georgia (1%)	Depth to saturated zone		
			Whitman (1%)	Ponding		
				Depth to saturated zone		
50B	Sutton fine sandy loam, 3 to 8 percent slopes	Very limited	Sutton (80%)	Depth to saturated zone	0.1	0.3
			Paxton (3%)	Depth to saturated zone		
			Leicester (3%)	Depth to saturated zone		
			Woodbridge (2%)	Depth to saturated zone		
			Rainbow (2%)	Depth to saturated zone		
60C	Canton and Charlton soils, 8 to 15 percent slopes	Somewhat limited	Canton (45%)	Slope	0.1	0.2
			Charlton (35%)	Slope		

Summary by Map Unit - State of Connecticut

Soil Survey Area Map Unit Symbol	Map Unit Name	Rating	Component Name (Percent)	Rating Reasons	Total Acres in AOI	Percent of AOI
73C	Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky	Very limited	Chatfield (30%)	Depth to hard bedrock	0.2	0.5
				Slope		
			Sutton (5%)	Depth to saturated zone		
			Leicester (5%)	Depth to saturated zone		
			Hollis (5%)	Depth to hard bedrock		
				Slope		
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	Very limited	Charlton (45%)	Slope	5.3	14.2
			Chatfield (30%)	Slope		
				Depth to hard bedrock		
			Sutton (5%)	Depth to saturated zone		
				Slope		
			Leicester (5%)	Depth to saturated zone		
			Hollis (3%)	Slope		
				Depth to hard bedrock		

Summary by Map Unit - State of Connecticut

Soil Survey Area Map Unit Symbol	Map Unit Name	Rating	Component Name (Percent)	Rating Reasons	Total Acres in AOI	Percent of AOI
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes	Very limited	Paxton (55%)	Depth to saturated zone	1.9	5.1
				Slope		
			Montauk (30%)	Depth to saturated zone		
				Slope		
			Woodbridge (3%)	Depth to saturated zone		
				Slope		
			Ridgebury (3%)	Depth to saturated zone		
84D	Paxton and Montauk fine sandy loams, 15 to 25 percent slopes	Very limited	Paxton (55%)	Slope	1.2	3.2
				Depth to saturated zone		
			Montauk (30%)	Slope		
				Depth to saturated zone		
			Charlton (3%)	Slope		
			Woodbridge (3%)	Depth to saturated zone		
				Slope		
			Ridgebury (3%)	Depth to saturated zone		
			Canton (2%)	Slope		
			Stockbridge (1%)	Slope		

Summary by Map Unit - State of Connecticut

Soil Survey Area Map Unit Symbol	Map Unit Name	Rating	Component Name (Percent)	Rating Reasons	Total Acres in AOI	Percent of AOI
103	Rippowam fine sandy loam	Very limited	Rippowam (80%)	Flooding	13.5	36.1
				Depth to saturated zone		
			Occum (5%)	Flooding		
				Depth to saturated zone		
			Suncook (5%)	Flooding		
				Depth to saturated zone		
			Pootatuck (3%)	Flooding		
				Depth to saturated zone		
			Lim (3%)	Flooding		
				Depth to saturated zone		
			Limerick (2%)	Flooding		
				Depth to saturated zone		
			Saco (2%)	Ponding		
				Flooding		
				Depth to saturated zone		

Summary by Rating Value

Rating	Total Acres in AOI	Percent of AOI
Very limited	37.2	99.1
Somewhat limited	0.3	0.9

Description - Dwellings With Basements

Dwellings are single-family houses of three stories or less. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet.

The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Parameter Summary - Dwellings With Basements

Aggregation Method: Dominant Condition

Component Percent Cutoff:

Tie-break Rule: Higher

DEPTH TO WATER TABLE RATING FOR STATE OF CONNECTICUT

102k6NaugLngMeadowLimitationsGW

Meters
0 40 80 160

Feet
0 100 200 400 600 800

102k6NaugLngMeadowLimitationsGW

MAP LEGEND

Depth to Water Table

(January to December), {Dominant Component, <}, [cm]

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Soil Map Units
- Cities
- Detailed Counties
- Detailed States
- Interstate Highways
- Roads
- Rails
- Water
- Hydrography
- Oceans

MAP INFORMATION

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov

Coordinate System: UTM Zone 18

Soil Survey Area: State of Connecticut
Spatial Version of Data: 3
Soil Map Compilation Scale: 1:12000

Map comprised of aerial images photographed on these dates:
4/3/1991; 4/12/1991

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Tables - Depth to Water Table

Summary by Map Unit - State of Connecticut

Soil Survey Area Map Unit Symbol	Map Unit Name	Rating (centimeters)	Total Acres in AOI	Percent of AOI
3	Ridgebury, Leicester, and Whitman soils, extremely stony	8	1.8	4.7
21A	Ninigret and Tisbury soils, 0 to 5 percent slopes	61	8.8	23.5
38C	Hinckley gravelly sandy loam, 3 to 15 percent slopes	Null	0.3	0.7
45B	Woodbridge fine sandy loam, 3 to 8 percent slopes	61	4.3	11.5
50B	Sutton fine sandy loam, 3 to 8 percent slopes	61	0.1	0.3
60C	Canton and Charlton soils, 8 to 15 percent slopes	Null	0.1	0.2
73C	Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky	Null	0.2	0.5
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	Null	5.3	14.2
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes	61	1.9	5.1
84D	Paxton and Montauk fine sandy loams, 15 to 25 percent slopes	61	1.2	3.2
103	Rippowam fine sandy loam	23	13.5	36.1

Description - Depth to Water Table

This attribute represents the depth to a water table in the soil during the specified months. Water Table refers to a saturated zone in the soil. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

In the underlying database, this attribute is actually recorded as three separate values. A low value and a high value indicate the range of this attribute for the corresponding component. A "representative" value indicates the expected value of this attribute for the corresponding component. For this soil property, only the representative value is used.

Parameter Summary - Depth to Water Table

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff:

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

HYDROLOGIC GROUP RATING FOR STATE OF CONNECTICUT

102k6NaugLngMeadowHydrologicGroup

102k6NaugLngMeadowHydrologicGroup

MAP LEGEND

Hydrologic Group

{Dominant Condition, <}

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available
- Soil Map Units
- Cities
- Detailed Counties
- Detailed States
- Interstate Highways
- Roads
- Rails
- Water
- Hydrography
- Oceans

MAP INFORMATION

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov

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4/3/1991; 4/12/1991

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Tables - Hydrologic Group

Summary by Map Unit - State of Connecticut

Soil Survey Area Map Unit Symbol	Map Unit Name	Rating	Total Acres in AOI	Percent of AOI
3	Ridgebury, Leicester, and Whitman soils, extremely stony	D	1.8	4.7
21A	Ninigret and Tisbury soils, 0 to 5 percent slopes	B	8.8	23.5
38C	Hinckley gravelly sandy loam, 3 to 15 percent slopes	A	0.3	0.7
45B	Woodbridge fine sandy loam, 3 to 8 percent slopes	C	4.3	11.5
50B	Sutton fine sandy loam, 3 to 8 percent slopes	B	0.1	0.3
60C	Canton and Charlton soils, 8 to 15 percent slopes	B	0.1	0.2
73C	Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky	B	0.2	0.5
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	B	5.3	14.2
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes	C	1.9	5.1
84D	Paxton and Montauk fine sandy loams, 15 to 25 percent slopes	C	1.2	3.2
103	Rippowam fine sandy loam	D	13.5	36.1

Description - Hydrologic Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are placed into four groups A, B, C, and D, and three dual classes, A/D, B/D, and C/D. Definitions of the classes are as follows:

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have

a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only soils that are rated D in their natural condition are assigned to dual classes.

Parameter Summary - Hydrologic Group

Aggregation Method: Dominant Condition

Component Percent Cutoff:

Tie-break Rule: Lower

About the Team

The King's Mark Environmental Review Team (ERT) is a group of environmental professionals drawn together from a variety of federal, state and regional agencies. Specialists on the Team include geologists, biologists, soil scientists, foresters, climatologists and landscape architects, recreational specialists, engineers and planners. The ERT operates with state funding under the aegis of the King's Mark Resource Conservation and Development (RC&D) Area - an 83 town area serving western Connecticut.

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

Purpose of the Environmental Review Team

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

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

Requesting an Environmental Review

Environmental reviews may be requested by the chief elected official of a municipality or the chairman of an administrative agency such as planning and zoning, conservation or inland wetlands. Environmental Review Request Forms are available at your local Conservation District and through the King's Mark ERT Coordinator. This request form must include a summary of the proposed project, a location map of the project site, written permission from the landowner / developer allowing the Team to enter the property for the purposes of a review and a statement identifying the specific areas of concern the Team members should investigate. When this request is reviewed by the local Conservation District and approved by the King's Mark RC&D Executive Council, the Team will undertake the review. At present, the ERT can undertake approximately two reviews per month depending on scheduling and Team member availability.

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