Royal Oaks Subdivision

East Hampton, Connecticut

Eastern Connecticut Environmental Review Team Report

Eastern Connecticut
Resource Conservation and Development Area, Inc.

Royal Oaks Subdivision

East Hampton, Connecticut

Environmental Review Team Report

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

for the
Planning and Zoning Commission
East Hampton, Connecticut

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Report No. 578

Acknowledgments

This report is an outgrowth of a request from the East Hampton Planning and Zoning Commission to the Connecticut River and Coastal Conservation District (CRCD). The CRCD referred this request to the Eastern Connecticut Resource Conservation and Development Area (RC&D) Executive Council for their consideration and approval. The request was approved and the measure reviewed by the Eastern Connecticut Environmental Review Team (ERT).

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

The field review took place on Tuesday, April 29, 2003.

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I would also like to thank Diane Blackman, town planner, Jeffry Foran, chair, East Hampton IWWA, Joe and Mat Pelletier, applicants, George Logan, Sigron Gadwa and James McManus, environmental consultants for the applicant, for their cooperation and assistance during this environmental review.

Prior to the review day, each Team member received a summary of the proposed project with location and soils maps. During the field review Team members were given plans and additional information. Some Team members made additional visits to the project site with the applicants and their engineer and consultants. 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 the landowner/applicant. This report identifies the existing resource base and evaluates its significance to potential and existing development, and also suggests considerations that should be of concern to the town. 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 subdivision.

If you require additional information please contact:

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Introduction

Introduction

The East Hampton Planning and Zoning Commission has requested assistance from the Eastern Connecticut Environmental Review Team in conducting a review of a proposed residential subdivision.

The 32.35 acre site is located on the east side of Smith Street in an R-2 zone. The applicant is proposing an affordable housing subdivision with 96 lots. The project will be served by public sewers and a community water supply system. The subdivision road system consists of a loop road from Smith Street with six small cul-de-sacs fora total of 4,348 linear feet of new road. The development is proposed to be constructed in two phases. Phase I will include Royal Oaks Avenue and two cul-de-sacs, detention basins #1 and #2, and 47 lots. Phase II will include Mathieu Lane and three cul-de-sacs and 49 lots. There are no direct wetland impacts being proposed.

Objectives of the ERT Study

The Town of East Hampton has requested assistance in evaluating this proposal for the site. Major concerns include: soils and erosion and sediment control, hydrology, stormwater management, indirect wetland impacts, and traffic and access.

The ERT Process

Through the efforts of the planning and zoning commission this environmental review and report was prepared for the Town of East Hampton.

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

The review process consisted of four phases:

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

The data collection phase involved both literature and field research. The field review was conducted on Tuesday, April 29, 2003. Some Team members made additional site visits. 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.

Figure 1

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Location Map
Scale 1" = 1000'

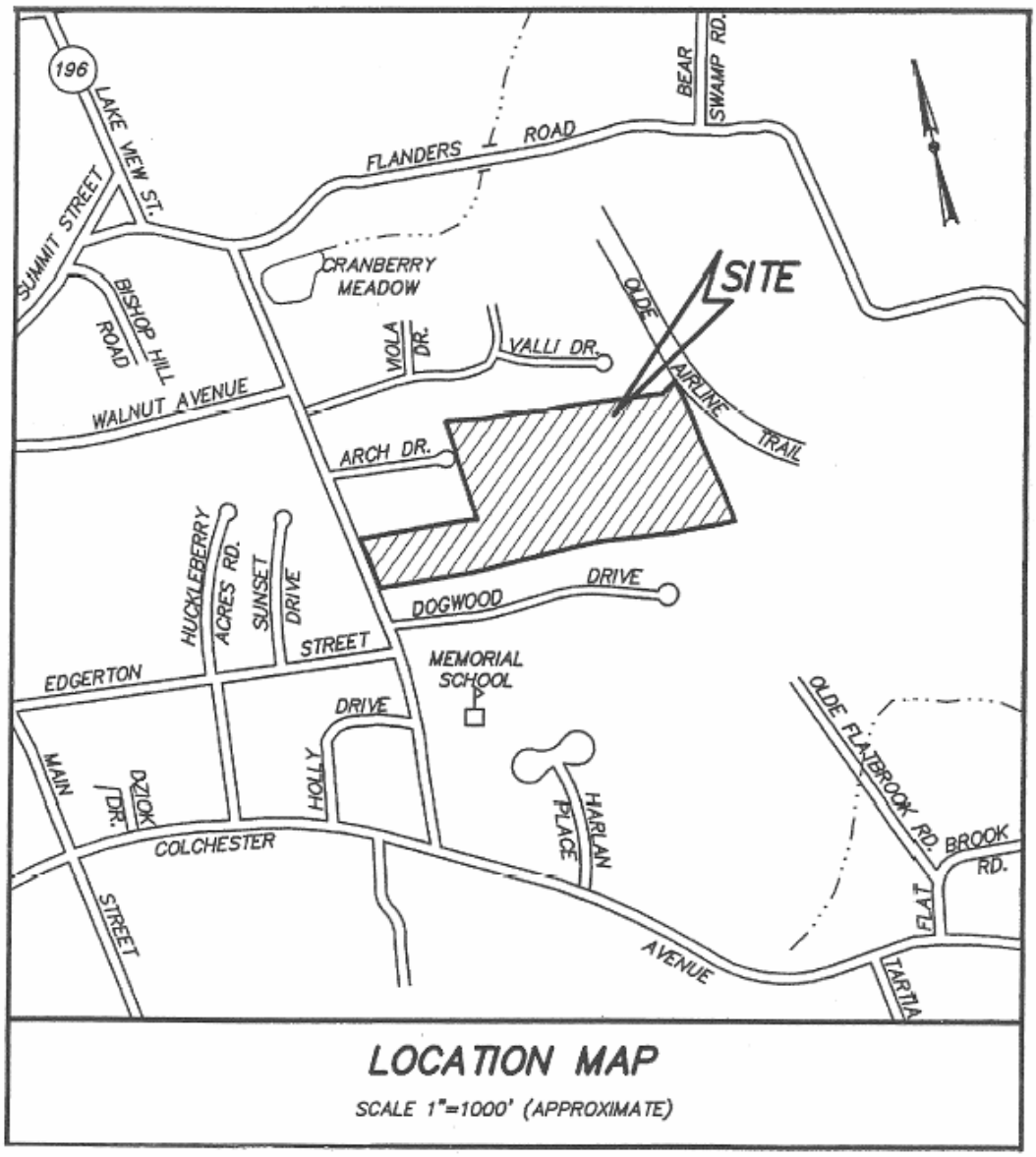

Figure 2

Topographic Map
Scale 1" = 2000'

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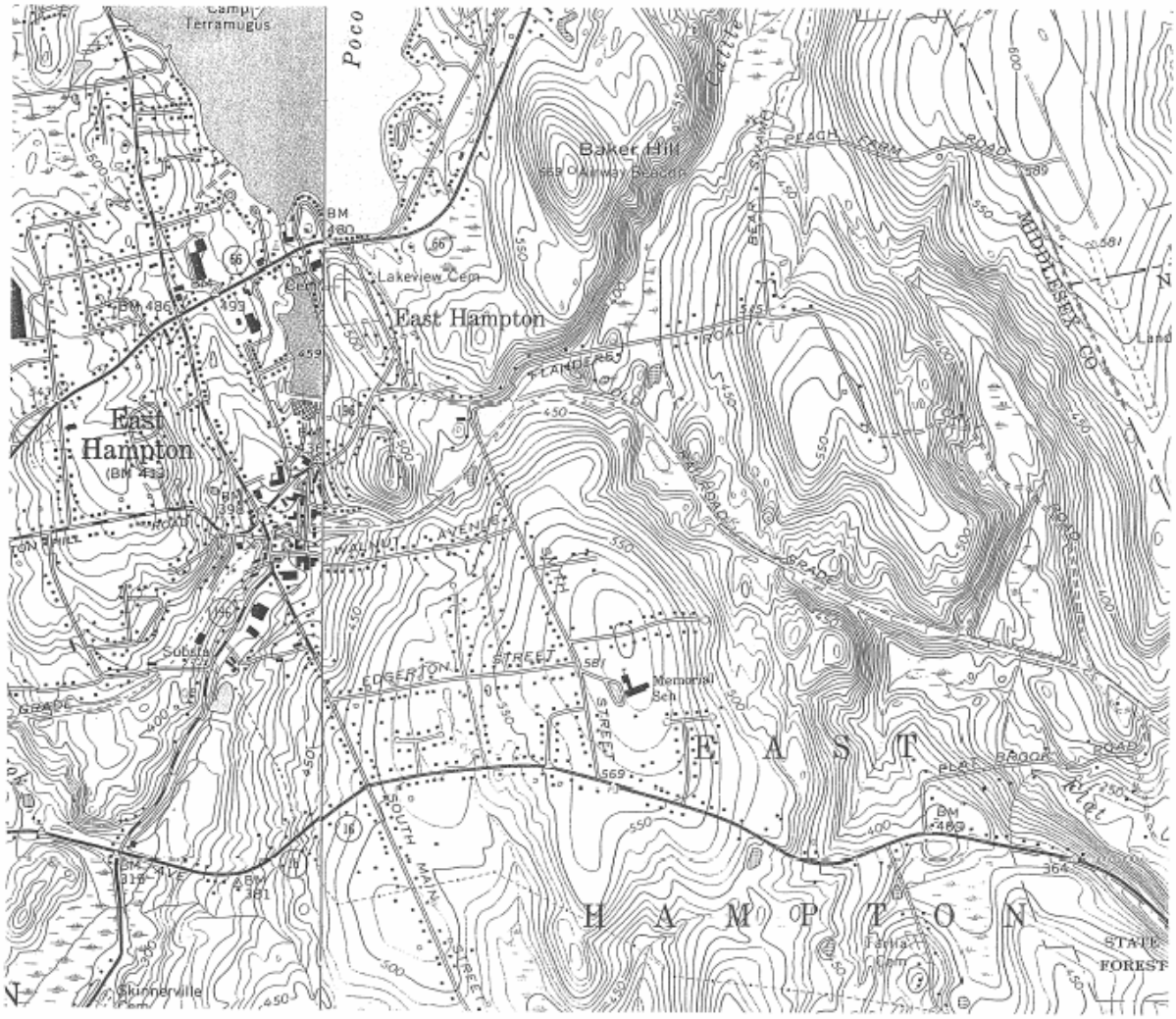

Figure 3

Development Plan

Not to Scale

Topography, Geology and Groundwater Hydrology

Topography

A 32+ acre parcel, proposed by Pelletier Development Company for an affordable housing subdivision, lies on the top and along the eastern flank of a drumlinoid shaped hill. The topography of the parcel is nearly flat on top of the drumlinoid hill and poses no problem to development. Hillside slope is moderately steep (0.14, rise/run) on the flank of the drumlinoid and development will require some engineering precaution.

Bedrock Geology

The parcel is underlain by the Brimfield Formation which is cut by a fairly narrow dike of diabase (Lundgren et al, 1971). The Brimfield Formation consists of sulfide bearing schist and gneiss and typically weathers rusty brown. It was formed by the metamorphism of Ordovician volcanic rocks and related sediments that were mineralized by iron- and sulfur-bearing hydrothermal-fluids during or soon after the rocks formed. Although mineral identifications were not made during the field walk, pyrite (FeS_2) and pyrrhotite ($Fe_{1-x}S$) commonly occur in the Brimfield Formation. Both minerals weather readily by reacting with water (H_2O) to form Fe-oxides (including Fe_2O_3) and hydroxides (such as $Fe[OH]_3$) and sulfuric acid (H_2SO_4).

During the Mesozoic Era (approx. 200 million years ago) three sets of diabase dikes were intruded into the country rocks deep beneath the surface of Connecticut at the time of intrusion. These dikes fed three basalt[1] lava flows at the ground surface; the lava flowed into and filled the Mesozoic Hartford Basin and today crop out as the trap-rock ridges throughout the central portion of Connecticut. A portion of the eastern-most (and oldest) dike was mapped by Lundgren et al, (1971), on the basis of it's greater rock-magnetism (in addition to iron bearing pyroxene and olivine, the diabase contains magnetite) and is shown of the topographic map.

Surficial Geology

During the last Ice Age, Connecticut was covered by an ice sheet greater than 1 km thick that moved from areas north toward the south-southeast. As the ice moved it eroded the rock beneath it and plastered some of the eroded debris (mud, sand and rocks, collectively called till) as a veneer of variable thickness atop the ledge. The erosion of bedrock and deposition of till worked to sculpt many of the hills into elongate, streamlined forms called drumlins. The proposed development is on top of and on the flank of a drumlin or drumlin-shaped hill. Drumlins typically have thick till deposited on their tops and thinner deposits of till on their flanks. Discontinuous bedrock exposures were observed on the steep eastern flank of the proposed development and suggest that the till-soils are very thin in this area, an observation also made by O'Leary (1975).

Erosion by the glacier is facilitated by fractures in the rock over which it moves. Summer melt-water seeps into fractures and refreezes, breaking the rock apart and forcing some into the flow of the glacier. Areas with numerous closely spaced fractures manifest themselves as straight aligned valleys and cliff faces. Some inferred fracture zones near the proposed development are indicated on the topographic map (Figure 4).

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[1] Basalt and diabase are igneous rocks that are composed of the same mineral composition, pyroxene or olivine (minerals containing iron) and plagioclase feldspar. Basalt is very fine-grained whereas diabase is fine- to medium-grained. Grain-size of igneous rocks is related to the rate of cooling and crystallization of the magma; rapid cooling produces finer textures.

Groundwater Hydrology

(Surface hydrology related to wetlands and water-courses will not be discussed here.) A community water system, proposed for the development, will be formed by drilling several wells into the bedrock. Water will seep into each well from the set of fractures that the well-bore intersects. The closer spaced the fractures the better the yield of water from the well. Based on the topography, it appears that the densest (closest spaced) fractures are near the base of the slope.

A set of springs is mapped at the base of the slope (O'Leary, 1975). Non-rusty water issues from the one spring observed on the field walk, suggesting that the spring water is part of a shallow water system and not connected to the bedrock aquifer.

Geologic impacts on proposed development.

- A storm water retention basin is sited in an area where the till is thin and will likely require blasting for its construction. This will produce fresh unweathered rock of the Brimfield Formation and possibly some trap rock. The traprock, if encountered, is a valuable resource that could be crushed and used for road construction. The Brimfield Formation is less useful and will likely be deposited somewhere on site as a means of disposal. It contains fresh iron sulfides that rapidly will weather to form rusty acidic water (not unlike acid mine drainage water) which may be detrimental to local wetlands.

- Consideration might be given to locating the water wells further down hill from the area proposed on the development where fractures are expected to be denser and thus yields higher.

- In nearby areas of Connecticut and Massachusetts, ground water derived from fractures in the Brimfield Formation contains dissolved iron that oxidizes when brought into contact with atmospheric oxygen, causing rust deposits. Consideration might be given to an appropriate water treatment to remove the iron prior to distribution to customers.

- When appreciable rainfall and snowmelt, that normally would recharge the shallow groundwater, encounters an impermeable surface (i.e. roads, roof tops, driveways), it will be diverted to the storm-water sewer system. The shallow water system up-hill will not be recharged at the same rate after construction is completed as it is now. That may that cause the springs at the base of the slope to stop flowing, thereby impacting the wetlands into which they drain.

References Cited.

Lundgren, L., Ashmead, L., and Snyder, G.L., 1971, Bedrock geology of the Moodus and Colchester Quadrangles. Conn. Geol. and Natl. History survey, Quad. Rpt. 27, 24p, Pl. 1.

O'Leary, D.W., 1975, Surficial Geologic Map of the Moodus Quadrangle, Connecticut. U.S.G.S. Geol. Quad. Map, GQ 1205.

Figure 4

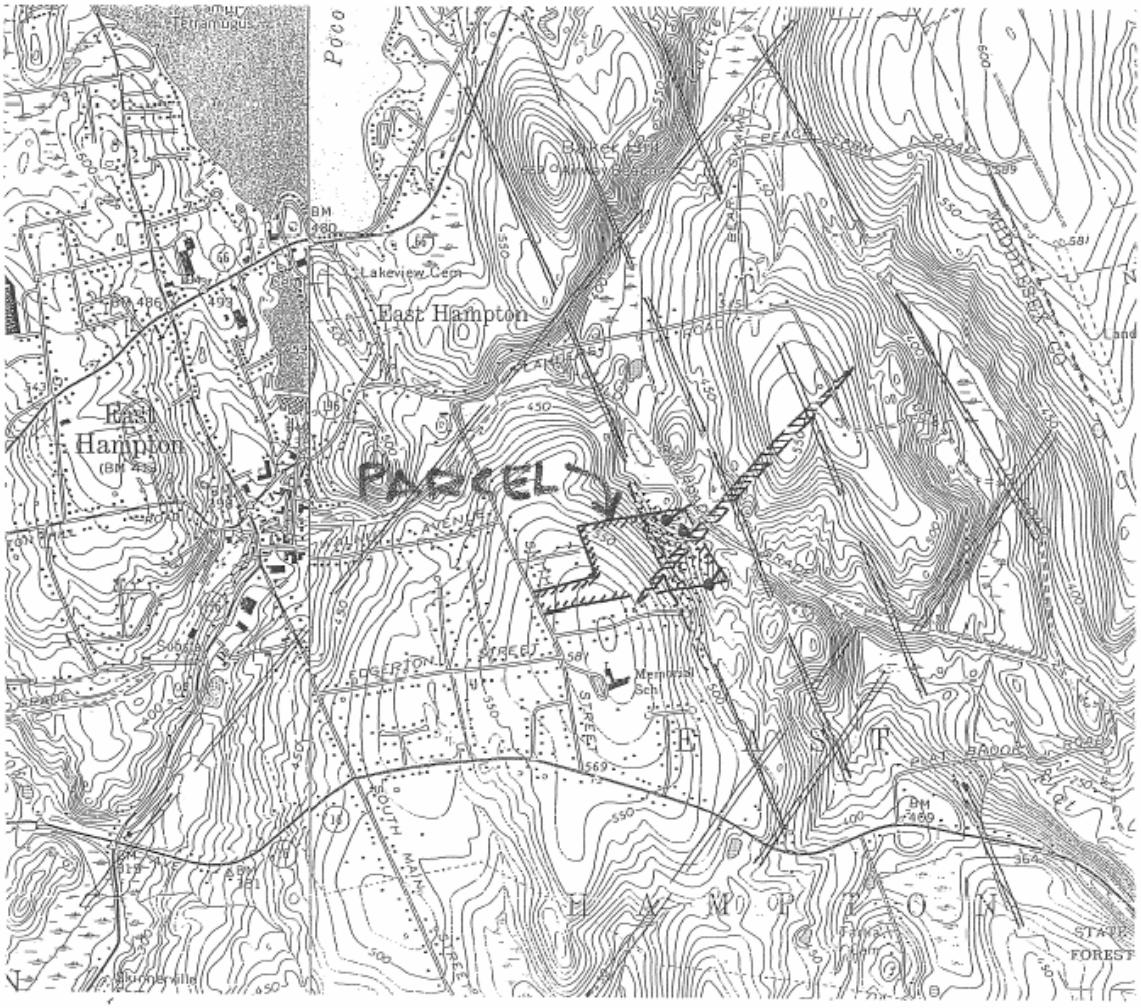
Inferred Fracture Zones

Diabase Dike
(Lundgren et al, 1971)

Inferred Fracture Concentrations

Discontinuous Outcrop: "Ledge" close to the surface, i.e. till, thin
(O'Leary, 1975, shown mainly on parcel)

Spring (O'Leary, 1975)



Conservation District Review

The following are general comments and recommendations regarding the proposed Royal Oaks Residential Community, Smith Street, East Hampton. Activities proposed include development of 96 single family homes on sanitary sewer; a community drinking water system; a loop road, six cul de sacs, and associated drainage system; a stormwater detention/retention facility in the western corner of the parcel on Smith Street (stormwater facility #1); a stormwater detention/retention facility to the east of the proposed residential development (stormwater facility #2); and a stormwater drainage system to convey runoff from a wetland in the center of the subdivision to a downgradient wetland.

Comments in this section are based on a review of:

- a series of site plans prepared by Dutton and Johnson, LLC dated April 26, 2003;
- a soil report prepared by ConnSoil dated November 11, 2002;
- a Watershed Modeling and Storm Drain Computation report prepared by Dutton and Johnson, LLC; dated April 2003;
- a review letter for Royal Oaks, Single Family Residential Community, from CLA Engineers, Inc. dated March 17, 2003;
- an Environmental Assessment, Proposed Royal Oaks Residential Community, Smith Street, East Hampton, Connecticut prepared by Rema Ecological Services (RES report) dated May 15, 2003;
- site visits conducted on April 29, 2003 and May 20, 2003.

The comments below are advisory in nature and are intended to assist municipal land use commissioners in their charge

Current Site Conditions

The majority of the site consists of wooded uplands and seepage wetlands on northeast facing slopes. The westernmost portion of the property, bordered by Smith Street, is a nearly level

abandoned farm field. A detailed description of existing site conditions, including vegetation cover types, is included in the May 15, 2003 RES report.

Four upland soil map units are shown in the project area on the Soil Survey Maps for Middlesex County (USDA/Soil Conservation Service, see Table 1). These soil survey maps are at a 1 :15,840 scale, which means that the smallest area delineated is approximately 2.5 acres. Caution should be taken when using the soil survey maps for site-level planning since at this scale soils in a single mapped unit can differ in slope, depth, drainage, and stoniness.

The westernmost portion of the property along Smith Street consists of nearly level to gently sloping Woodbridge fine sandy loam (WxB) and the central portion of the parcel of gently sloping to sloping Woodbridge extremely stony fine sandy loam (WzC). These Woodbridge soils are associated with side slopes of drumlins and glacial till uplands, are moderately well drained, have a seasonally high water table at about 18 inches, moderate surface permeability, slow to very slow substratum permeability, and medium runoff.

The eastern portion of the parcel consists of Paxton and Montauk extremely stony fine sandy loams (PeD) and Charlton-Hollis very stony fine sandy loams (CrC). Paxton and Montauk soils are associated with hillsides of drumlins and glacial till plains. They are well drained, with medium runoff, moderate surface permeability, and slow to very slow permeability in the substratum.

Charlton and Hollis soils are found on upland glacial till plains and on ridges where the relief is affected by underlying bedrock. The CrC soils complex is comprised of intricate patterns of Charlton (50%), Hollis (30%), bedrock outcrops and other soils (20%) that could not be mapped in the soil survey separately. Charlton soils are well drained, moderately permeable soils. Hollis soils are shallow, with hard unweathered schist found at a depths of 14 inches. Permeability above the bedrock is moderate to rapid and runoff is medium to rapid.

As described in the RES report, Woodbridge and Paxton soils have a compact substratum, or hardpan layer, that is slow to very slowly permeable. This means that once the surface and subsoil are saturated water will no loner infiltrate, but will drain along natural topographic features to seep into low lying drainageways and depression. The site topography is such that

the majority of the drainage is easterly towards the two large wetland systems that extend off site from the southwest and northeast corners of the parcel.

Wetlands were field delineated and soils are described in the RES report as Leicester, Ridgebury, and Whitman poorly and very poorly drained extremely stony fine sandy loams (LG). In the soil survey these soils are mapped together as a unit because they react similarly to most land use and management practices. The soil survey map shows an area of LG in the far northeast corner of the parcel and off site to the north. The majority of on-site wetlands are described in the RES report as seasonally flooded, seasonally saturated wooded swamps (one small wetland is described as a palustrine emergent wetland/shallow marsh). All of the wetlands are either entirely or partially fed by groundwater from seeps or springs (groundwater slope wetlands). A full description of groundwater slope wetlands is provided in the RES report. Features of groundwater slope wetlands to note include that they:

- occur where shallow groundwater discharges at springs or seeps in the land surface;
- are seasonally saturated unless groundwater flow is continuous;
- will dry during late summer or early fall as vegetation depletes soil moisture levels; and,
- provide negligible groundwater recharge especially since they are formed over dense hardpan layers in areas of perched shallow groundwater systems.

Erosion and Sedimentation Control Recommendations

The proposed Erosion and Sedimentation (E&S) control plan includes construction entrance anti-tracking pads, temporary stockpiles, and geotextile silt fence (sediment impoundment, barrier and filter measure). All elements of the E&S control plans should be developed and implemented in accordance with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Controls (2002 Guidelines) .

1. The combination of steep slopes and erodible soils increases the hazard of erosion and sedimentation on this site. Once soils underlain by hardpan are saturated rainfall will begin to runoff instead of infiltrate, potentially causing erosive surface flows that will tend to concentrate on steep slopes (10-20%). The amount and duration of disturbance should be kept to a minimum during the construction of the subdivision road, stormwater management structures,

residences, utilities, and water supply system. In steep areas additional controls may be required: secondary rows of geotextile silt fence especially in areas where the contributing drainage area exceeds the recommended 1 acre; non-living soil protection such as erosion control blankets; and diversion of runoff from cut and fill slopes until stabilized (e.g., temporary fill berms and pipe slope drains).

2. The site plans must include a legend with all E&S controls specified.

3. The site plans must be signed and sealed by a Connecticut Professional Engineer since the plans include engineered E&S control measures.

4. All wetland flagging should be re-established prior to beginning clearing, grubbing, or grading activities for the stormwater facilities, subdivision roads, and individual lots.

5. Perpendicular wings should be specified for the geotextile silt fence to break the velocity of water flowing along the fence where it crosses contours. In general, for slopes of 5:1 or flatter perpendicular wings are placed every 100 feet; for 3:1 to 5:1 slopes every 75 feet; and for 2:1 to 3:1 slopes every 50 feet (per 2002 Guidelines).

6. Individual lots constructed after the subdivision road is completed (and sedimentation protection is removed from the road drainage system) will require construction entrance anti-tracking pads where driveways intersect with the subdivision road.

7. Temporary sediment traps (contributing drainage area < 5 acres) or basins (contributing drainage area > 5 acres) are not shown on the site development plans. If a sediment impounding trap or basin will be proposed, the site development plans should detail the location, size, maintenance requirements, and a re-naturalization strategy for each structure.

8. If specimen trees will be saved then a tree protection detail should be provided following the Tree Protection Measure in the 2002 Guideline.

9. E&S controls for dewatering operations should follow the 2002 Guidelines. Construction details should be provided for either the Pump Intake and Outlet Protection or Pumping Settling Basins control measures.

10. Stormwater inlets must be adequately protected until areas contributing to the road drainage system are stabilized. Construction details should be provided for a sediment impounding, barrier and filtering measure for all catch basins and water quality inlets (oil/particle separators).

11. E&S control measures should be evaluated to break erosive flows (e.g., stone check dams or hay bale dams) on the rough graded subdivision road and where sewer, water, and stormwater conveyance lines are installed on grades perpendicular to the slope.

12. An alternative location should be evaluated for the large surplus material storage area shown in Phase 1 of the E&S control plan. Stockpiles should be located in relatively gently sloped areas that need to be disturbed for road, lot, or other development related activity. Only a portion of the area shown as a material stockpile location is to be cleared for road/lot grading, and the location is fairly steep sloped. If the proposed location is used a temporary diversion measure may be required to divert runoff from the slope above away from the stockpile.

13. An E&S control measure should be shown downslope of the pipe inlet conveying drainage from the central wetland to the southwestern wetland in Phase 1 of the E&S control plan.

14. Clearing limits should be shown for all activities requiring clearing and/or grubbing, e.g., geotextile silt fence is shown in uncleared areas on both the Phase 1 and 2 of the E&S control plans.

15. A sediment impoundment, barrier and filter method should be shown for all areas downslope of the stormwater detention facilities, e.g., to the north of stormwater facility #2 and the northwest of stormwater facility #1.

16. If a surface water diversion is necessary upslope of stormwater facility #2 a Temporary or Permanent Diversion measure should be specified in accordance with the 2002 Guidelines instead of geotextile silt fence currently shown. Geotextile silt fence is generally used to capture sheet flow at the toe of a slope, in drainageways, or encircling catch basins, but is not appropriate as a diversion measure.

17. Slope stabilization measures or cross slope benches are required on slopes steeper than 2:1 and for slopes steeper than 3:1 when the change in elevation exceeds 15 feet. The need for slope stabilization should be evaluated for all cut/fill slopes, especially on lots 32, 41, 42, and 43.

18. Relocating the level spreader outlet for the stormwater drainage from the central wetland should be evaluated so that it can be maintained from the upslope water supply wells access road. Conditions downslope from level spreaders should be such that the flows do not reconcentrate after release (2002 Guidelines require slopes of 5% or less with stable vegetation below spreader lip). For this level spreader, however, flows could be encouraged to enter the existing drainageway upslope and to the south of the wetland.

19. The E&S control plan should specify:

a) Temporary seeding or non-vegetated protection of all exposed soils and slopes to be initiated within the first 7-days of suspending work in areas left longer than 30 days.

b) Separate non-living soil protection measures for areas that are seeded (Mulch for Seed measure) and areas exposed that cannot be seeded because conditions prohibit the establishment of vegetative (Temporary Soil Protection or Erosion Control Blanket).

c) Maintenance requirements for all E&S control measures and the appropriate location for disposing material removed during maintenance of sediment impoundments, barriers, or filters. Material should not be deposited in wetlands or in exposed areas.

d) Dust control chemicals (other than water) should not be used in wetlands or in the 100-foot upland review area.

e) Lime rates consistent with the 2002 Guidelines, e.g., 90 lbs/1000 sq. ft for sandy loams.

f) Maintenance requirements for permanent E&S control measures (sediment forebays, level spreaders, rip rap splash pads, etc.)

g) The name and contact information of the person or organization responsible for maintaining the permanent E&S control measures.

h) The name and contact information for the person responsible for maintaining the E&S control measures during construction.

i) Inspection of all E&S control measures after a 1/2 inch or greater rainfall within 24 hours in addition to weekly inspections.

j) A plan and schedule for winter stabilization of disturbed areas remaining at the end of the active construction season (e.g. November).

k) Removal of all E&S controls once disturbed areas are stabilized.

Wetland Recommendations

Although no activities are proposed within wetlands or watercourses, the development of the parcel poses the potential for both short-term and long-term indirect impacts. Potential short-term impacts are generally related to construction activities and include uncontrolled soil erosion and sedimentation, accidental disturbance of wetlands and watercourses, and disruption of wetland associated wildlife. Short-term impacts can be minimized through the development, implementation, and maintenance of appropriate soil erosion and sedimentation controls (see section above), project phasing and sequencing to limit the total amount of land disturbed at once, well demarcated construction limits and accessways, and scheduling construction to avoid wildlife breeding and migration activities.

Potential long-term impacts are generally related to changes in on-site hydrology, water quality, or wetland dependent wildlife habitat. In addition, invasive plant species can capitalize on disturbance caused by clearing, grubbing and grading activities. Long-term impacts can be minimized through appropriate stormwater management (see section below), adequate upland buffers, and invasive plant species management. The following issues pertaining to the proposed site development plans should be considered:

1. Pre-development wetlands hydrology should be preserved to the greatest extent possible. Although on-site wetlands are described as groundwater slope wetlands fed by springs and seeps they do receive surface inputs from precipitation and overland flow. Maintaining intact vegetated wetland buffers will help maintain pre-development hydrology and water quality. In addition, opportunities to minimize the amount of residential lawn, semi-impervious, and impervious surfaces in the upslope contributing drainage area of the wetlands should be evaluated. Conservation easements are proposed to protect wetland buffers. To maximize the positive impacts of the proposed conservation easements the following should be considered:

a) Extend the conservation easement to the clearing limits shown on the site plans for lots 51, 63, 64, 81-84, 90, and 91.

b) Preserve a larger area of the upslope contributing drainage to wetlands in the central portion of the development, e.g., evaluate the impacts of lots 50, 80, 93, 94 on the hydrology and water quality of the downslope wetlands.

c) Eliminate clearing and grading activities in proposed conservation easement areas, e.g., grading on lot 50.

d) Maximize the intact contributing drainage area of the vernal pool in the northeast corner of the parcel by extending the conservation easement to the clearing limit shown on the site plans for lots 42 and 43.

2. An invasive plant species monitoring and management plan should be provided for all disturbed areas, especially areas cleared for sewer, water, and stormwater lines; level spreaders, and stormwater facility #2.

3. The impact of the conveyance pipe from stormwater facility #2 to the level spreader located in the southeast corner of the parcel should be evaluated. The site development plans propose installing the outlet pipe adjacent to the erratic outcrop at the tip of a natural wetland seep area. The amount of disturbance required to install the pipe and future maintenance requirements of the proposed drainage easement should be evaluated with respect to potential impacts on the downslope wetland.

4. Construction activities should be timed to minimize impacts to the wetland dependent species and species of special concern described in the RES report (pool-breeding amphibians, Eastern box turtles, and red shouldered hawk). Every effort should be taken to avoid disturbance of favored habitat during the breeding season. A site inspection plan to locate and protect these species prior to initiation of each construction phase should be evaluated.

Stormwater Management Recommendations

Two stormwater management "treatment trains" are proposed to mitigate stormwater runoff quantity and quality impacts. The first will manage runoff from the westernmost portion of the development (contributing drainage area approximately 3.7 acres) and consists of catch basins, a water quality inlet, a detention/retention basin (stormwater facility #1), and a plunge pool outlet. The second, east of the residential development, will manage most of the remaining runoff (contributing drainage area of approximately 15.5 acres) and consists of catch basins, a water quality inlet, and a detention/retention basin (stormwater facility #2). The following issues pertaining to the proposed stormwater management plan should be considered:

1. Water quality inlets, otherwise known as oil/particle separator, are baffle type secondary treatment practices that are suitable for stormwater pre-treatment. A number of factors limit the treatment capacity of water quality inlets, including re-suspension of trapped sediments when used in-line, ability to treat a relatively small contributing drainage area, and necessity for

frequent maintenance. The following recommendations pertaining to water quality inlets should be considered (reference material available in the Appendix):

a) Water quality inlets are most effective when used in an off line configuration to treat peak flow associated with the water quality volume (see RES report appendix 8 for calculations).

b) The impervious cover in the contributing drainage area of each water quality inlet should generally be limited to 1 acre or less, and a permanent pool volume of 400 cubic feet per acre of impervious area should be provided. The proposed impervious surface for the contributing drainage area of stormwater facility #1 is approximately 1.4 acres and for stormwater facility #2 is approximately 4.4 acres.

c) Maintenance is critical to the continued function of water quality inlets - monthly inspections and cleaning every one to six months may be required depending on the season.

2. The two stormwater detention/retention facilities are proposed to be designed as stormwater wetlands, specifically extended detention shallow wetlands. Stormwater wetlands are a primary treatment practice that provides significant pollutant removal when properly designed and constructed (see Table 2 and reference material in the Appendix). Effective pollutant removal depends on adequate hydrologic conditions to support wetlands vegetation and maintain a permanent pool. Stormwater wetlands can either be designed with an impermeable liner or must intersect the groundwater table. If a liner is used then the contributing drainage area must be large enough to provide stormwater flows that will maintain wet conditions during seasonally dry periods (roughly 25 acres). If the groundwater table is intersected then the seasonal variation in groundwater elevations must be assessed to ensure a permanent pool is maintained. Other critical design features include sizing, depths, and flow paths of both the pre-treatment forebay and the main wetland area. The following issues pertaining to the proposed stormwater wetlands should be thoroughly considered:

a) As described in the RES report, Paxton and Woodbridge soils have a hardpan layer that limits moisture storage capacity. This means that the on-site vernal pool and seep wetlands are seasonally saturated, but then dry out rapidly in the summer during the warm vegetative growing season. Prior to constructing either detention/retention basin as a stormwater wetland groundwater levels should be monitored for a complete season to ensure that the local hydrologic conditions will support the basin's vegetation and pollution removal functions. A water budget should also be calculated to ensure that evaporative loss will not exceed inflows during warm weather months.

b) Stormwater facility #1 as shown on the site plans is approximately 75' x 75' x 8', with 20' between the inlet and outlet, and 2:1 slopes. The contributing drainage area to this facility is approximately 3.74 acre. The proposed size and location of this detention/retention basin may preclude the basin from being designed as an extended detention shallow wetland. If the facility is designed as a dry detention basin a sediment forebay with a deep permanent pool should be provided and the inlet/outlet separated to allow for a longer flow path and to minimize short-circuiting.

c) Sediment forebay must have an adequate depth to prevent resuspension of collected sediments during storm flows. Recommended depths for forebays and permanent pools range from 4 to 6'. The forebay shown for stormwater facility #2 is 2' deep. Providing a deeper forebay will enhance the constructed wetland's treatment performance and will minimize the potential for collected sediments to enter the main treatment basin.

3. Detailed plans to construct, plant, monitor, and maintain proposed stormwater wetlands should be included on the site development plan sheets. This plan should include:

a) A schedule to inspect plant establishment and survivability, water levels, slope stability (recommended twice per year for first five years).

b) The name and number of the individual/organization responsible for the inspections.

c) Optimal planting dates for the proposed plantings.

d) Details on invasive species monitoring and removal.

e) Requirements for maintaining the stormwater wetlands and the name/number of the individual or organization responsible for routine maintenance.

4. The predicted Total Suspended Solids (TSS) removal efficiency of the stormwater treatment train (RES semi-quantitative assessment, pg. 72 RES report) should be evaluated with respect to the values provided in Table 3 of Appendix 8. Justification should be provided for the removal rates used for each BMP. For example, in Table 3 catch basins have a median removal efficiency of 5%, annual catch basin cleaning 7%, sediment floatables traps 25%, conventional detention pond 7%, extended detention shallow wetland 76%. Using these values the TSS removal efficiency at the end of the first treatment train would be 84% if stormwater facility #1 was designed as a stormwater wetland and 60% if the facility remained a conventional detention pond.

Table 1. Summary of upland soils mapped on the proposed project site

	Soil Map Unit			
	CrC	**WxB**	**WzC**	**PeD**
Soil Type	Charlton-Hollis very stony fine sandy loam	Woodbridge fine sandy loam	Woodbridge extremely stony fine sandy loam	Paxton and Montauk extremely stony fine sandy loam
Slope	3-15%	3-8%	3-15%	15-35%
Proposed activity	Stormwater facility #2 including outlet pipe	All or part of lots 1-25, 66, 67, 74, 75, 77-80, 94-96; stormwater facility #1	All or part of lots 26-30, 35, 38-42, 46-74, 76, 80-94	All or part of lots 31-34, 36-38, 42-45, 50; stormwater conveyance, stormwater facility #2, water supply wells
Hydrologic group	B – high infiltration & low runoff	C – low infiltration & high runoff		
Drainage	Well to Excessive	Moderately Well	Moderately Well	Well
Erosion Potential	Moderate to severe	Moderate[1,2]	Moderate[1]	Moderate[1]
Principal Limitations	Steep, stony, shallow depth to bedrock, & outcrops (Hollis)	Wet, slow permeability, perched water table & frost action	Stony, wet, slow permeability, perched water table, & frost action	Steep, stony, wet, slow permeability, & frost action
Buildings w/ or w/out basements	Charlton - Moderate Hollis - Severe	Severe[3]	Severe[3]	Severe[3]
Lawns and gardens	Charlton - Moderate Hollis - Severe	Slight	Severe[3]	Severe
Shallow excavations	Charlton - Moderate Hollis - Severe	Severe	Severe	Severe

[1] *steep slopes of excavations slump when saturated*
[2] *this map unit qualifies as potentially highly erodible land (USDA/SCS 1980)*
[3] *wet, may require artificial drainage*

Table 2. Design Criteria for Stormwater Wetlands

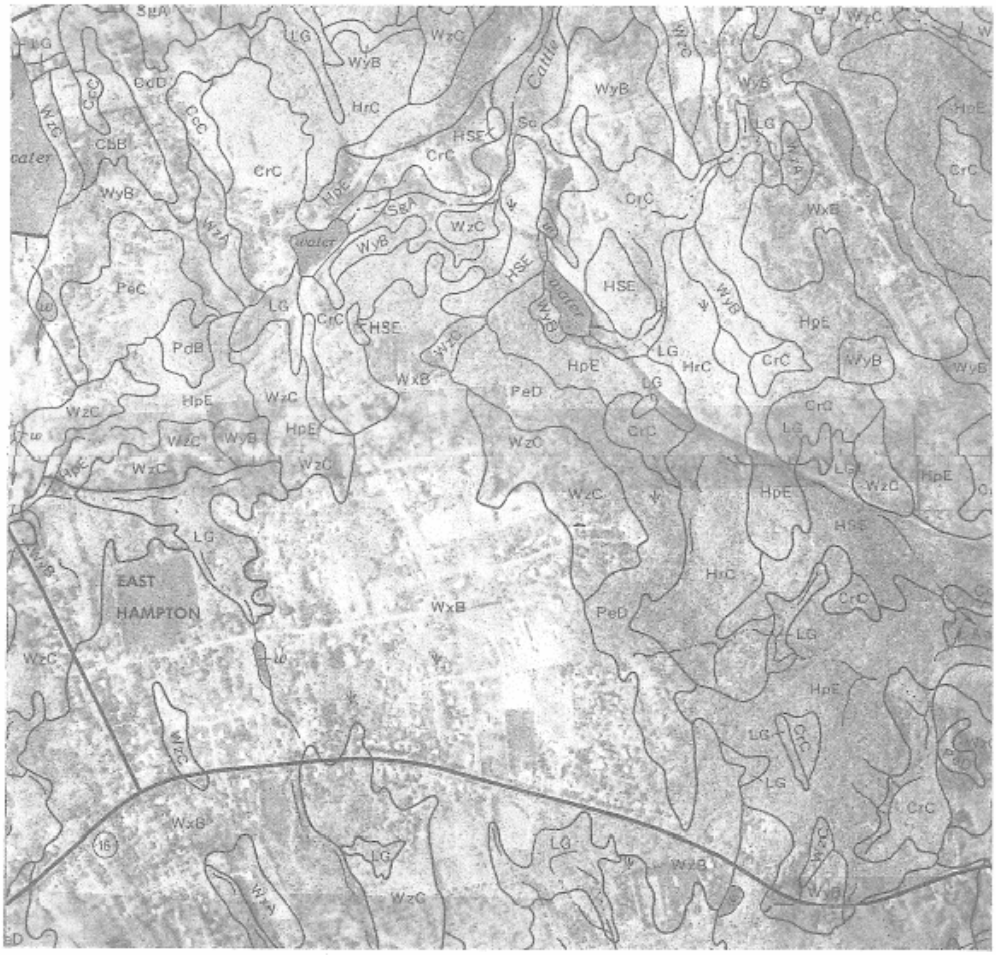
Parameter	Design Criteria
Setback requirements	• 50 feet from on-site sewage disposal system • 50 feet from private well • 10 feet from property line • 20 feet from any structure • 50 feet from any steep slope (greater than 15%)
Preferred Shape	Curvilinear
Side Slopes	3:1 maximum or flatter preferred
Length to Width Ratio	3:1 minimum along the flow path between the inlet and outlet; flow length is the length at mid-depth. Mid-depth is (avg. top width+avg. bottom width)/2
Pretreatment Volume	Forebays are highly recommended for stormwater wetlands and sized to contain at least 10% of the WQV. Outlet micropools should also be sized to contain 10% of the WQV. For sites with potential for higher pollutant loads, 100% of the WQV must receive pretreatment.
Drainage Area	Minimum contributing drainage area is typically 25 acres. Stormwater wetland should have a surface area at least 1 to 1.5% of the contributing watershed area.
Underlying Soils	Low permeability soils are best (NRCS Hydrologic Soil Group A and B soils require modifications to maintain a permanent pool unless groundwater is intercepted).
Size	The size of the wetland area will be based on desired pollutant removal efficiencies and the depth of water available to store the WQV. Suggested guidelines for the ratio of wetland to watershed areas is 0.2 for shallow marshes and 0.01 for extended detention shallow wetland systems and pond/wetlands.
Depth	Average water levels in the marsh/wetland areas can vary between 0.5 and 1.5 feet. Maximum water depths will depend on the site topography and the design of the system. Forebays and micropools should typically have a permanent pool depth of between 4 and 6 feet.

Table 11-P2-1 from *Draft Connecticut Stormwater Quality Manual* (source: Adapted from MADEP, 1997 and Schueler, 1992)

Figure 5

Soils Map

Scale 1" = 1320'



Stormwater Management Review

The project is a proposed 96-unit subdivision on approximately 32 acres on the east side of Smith Street. Approximately 22 acres will be disturbed in two phases for the construction of roads and houses. Public sewers and a community water system will serve the lots. Smith Street borders the site the west and other residential property borders to the north, east and south. Construction disturbance will be limited to 14.7 acres in the first phase and 7.1 acres in the second phase. The proposed lots are arranged along a central loop road and a series of cul-de-sacs off of it. There are limited areas of wetlands within the subdivision that will be protected by conservation easements. The rear quarter (east end) of the property will remain undeveloped and dedicated to drainage and conservation easements. The plans show that no wetlands will be disturbed although activity will take place within the town's 100-foot wetland buffer.

The existing drainage pattern for the first 800 feet east of Smith Street flows back toward the street. The remainder of the existing drainage flows to the east and into a vernal pool and wetland complex at the east end of the property. The site topography ranges from grades of 5% to 25% with most of the steeper grades in the eastern, undeveloped portion of the site.

The proposed drainage system consists of catch basins within the road system and follows the existing drainage patterns to detention basins. The section of the property draining to Smith Street flows into a small detention basin and then a riprap plunge pool before discharge to the Smith Street drainage system. Most of the remainder of the drainage will be collected in roadway catch basins and discharged to a large detention basin in a drainage easement toward the east end of the site. The well system and pump house for the community water system will be located adjacent to this basin. The outfall from this basin will discharge to a level spreader adjacent to the wetland complex at the southeast corner of the site. A small wetland pocket that will be isolated in the south central portion of the site will be allowed to drain to wetlands in the northeast corner of the site through a piped drainage connection discharging eventually to a level spreader near those wetlands.

Design plans were submitted although no drainage calculations were included. Confirmation should be provided that the detention basins, level spreaders and riprap plunge pool designs are adequate for the proposed discharges. The plans submitted address erosion and sedimentation control for the site. However, these plans are at such a small scale that the level of detail necessary to properly implement the elements is lacking. Cross-sections of the drainage and detention systems are shown on sheet A-02-080-D1, but there is no indication on the submitted plans as to where these sections were taken. It is assumed that Section A-A on this sheet is a section of the pervious berm separating the sediment forebay from the rest of the east detention basin. If so, a layer of filter fabric should be installed between the 3/8-inch washed stone and the modified riprap layers. The plans indicate that silt fence will be used to divert surface flow from undisturbed areas around some disturbed areas. While usually not an appropriate use of silt fence, this may have some merit by negating the need to otherwise disturb areas to construct slope benches for the same purpose. However, this silt fence must be carefully installed and constantly inspected and maintained to ensure that it doesn't create conditions for erosion.

Total disturbance for road and lot construction will be over 5 acres, which will require registration for the General Permit for the Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities. The plans do not indicate a sediment forebay in the detention basin along Smith Street. The plans and detail sheet do show a "sedimentation chamber" prior to discharge to this basin. The general permit requires, among other things that the storm sewer system be designed with a goal of 80% long-term sediment removal. The proposed sedimentation chamber (typically referred to as a "Glastonbury" chamber) does not meet this requirement. While it may remove the largest sediment particles, studies have shown that these structures are subject to periodic "flushing" of accumulated sediments. The detention basin should either be redesigned to include an appropriately sized sediment forebay or a more sophisticated sedimentation structure that utilizes "swirl concentrator" technology or equal should replace the indicated chamber. Some swirl concentrators (or equal) include Baysaver, V2B1, Vortechnics, Downstream Defender, Stormceptor and others.

For any areas collecting runoff from more than two acres, the general permit also requires temporary construction sedimentation basins or swales providing storage of 134 cubic yards per acre drained. For areas collecting runoff from 2 to 5 acres, this can be accomplished with gravel and silt fence check dams along the roadway swales or any diversion swales. For areas collecting over 5 acres, a sedimentation basin with filtered outlet must be provided. While the proposed detention basins may be modified to function as sedimentation basins during construction, these modifications should be shown on the plans and details. The locations of any sedimentation swales must also be shown on the plans including details of filtration measures. During road construction and before final pavement is placed, the rough graded road beds can serve as collection swales for site runoff, posing a significant erosion hazard. This will be a particular concern in areas with steeper slopes and road grades. Measures should be shown on the plans and details for gravel and/or haybale check dams or other measures to mitigate this problem. The details should also show how catch basins will be protected during construction. There are two level spreaders shown on the plans. Details of their construction should be shown on the detail sheets.

Disturbed areas must be stabilized as soon as activity has ceased for more than 7 days. A narrative plan for stabilization and maintenance of the disturbed areas should be provided including procedures for stabilizing the site for the winter. A registration for the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities must be submitted at least 30 days prior to the start of construction. A Stormwater Pollution Control Plan must also be prepared and submitted at the same time. Properly constructed and maintained, the site should have minimal impact on the adjacent wetlands.

Traffic, Access and Planning Considerations

Royal Oaks is a proposed single family detached residential subdivision. It is a high density proposal in an R-2 zone. The proposal is for ninety-six units on a 32.3 acre parcel located on the eastern side of Smith Street between Arch Drive and Dogwood Drive.

Traffic Volumes

Traffic counts were performed by Midstate Regional Planning Agency (MRPA) in April of 2003 in the vicinity of the site. The average daily traffic (ADT) on the northern end of Smith Street was 1,840 vehicles per day and 1,800 on the southern end of Smith Street. Additional counts were taken on Walnut Avenue, where the ADT was 300 and on Edgerton Street where there was an ADT of 470. (See Figure 6)

Traffic counts performed by ConnDOT in 2000 in the vicinity of the site include counts of 8,000 on Route 16 west of Smith Street and 6,900 east of Smith Street. Counts of 6,100 on Route 196 south of Route 66 and 3,300 south of Flanders Road were also taken in 2000. In addition, the ADT on Route 66 was 13,000 west of Route 196 and 14,300 east of Route 196. (See Figure 7)

The Institute of Transportation Engineers (ITE) Trip Generation Manual, 6th Edition, shows an average of 9.57 weekday trips generated per dwelling unit. Trip generation is slightly higher on Saturdays and slightly lower on Sundays. Using these figures the proposed 96 unit development would generate approximately an additional 919 trips per day on Smith Street. As noted above, the current ADT on Smith Street is about 1,820 vehicles per day. The additional traffic from the proposed development would increase traffic by approximately 50% on Smith Street, bringing the traffic up to over 2,730 vehicles per day.

The a.m. peak hour and p.m. peak hour are the times of greatest volumes. The a.m. peak hour generally falls sometime between 7:00 and 9:00 a.m., while the p.m. peak hour usually occurs sometime between 4:00 p.m. to 6:00 p.m. Based on the figures and sources previously noted, the proposed development would generate approximately 74 additional a.m. peak hour trips, with 19 entering and 55 exiting the proposed Royal Oak Avenue onto Smith Street. Similarly, the p.m. peak hour would generate approximately 98 additional trips with a directional split of 63 entering and 35 exiting the proposed street.

The current maximum a.m. and p.m. peak hour volumes were 81 and 151 respectively on the northern end of Smith Street and 72 and 132 on the southern end of Smith Street. Provided that half of the traffic generated from the proposed development travels north and the other half travels south, then the a.m. and p.m. peak hours could increase to approximately 118 and 200 on the northern end of Smith Street and 109 and 181 on the southern end of Smith Street.

Traffic Signalization

Stop signs are present on both ends of Smith Street and would likely be sufficient for the traffic volumes. An in depth signal warrant analysis would likely not justify a traffic control signal on either end of Smith Street, based upon an eight, four or peak hour warrant analysis using the Manual on Uniform Traffic Control Devices (MUTCD) millennium edition.

Crash experience at the intersection of Smith Street with Route 16 would also not warrant a traffic control signal at this intersection. Between 1998 and 2000 there were only two crashes at this intersection. During the same period there was an additional three crashes between Holly Drive and Smith Street and between Smith Street and Harlan Place.

Schools often require a pedestrian actuated signal in conjunction with standard signs and pavement markings. To address this issue a study would have to be conducted to analyze the frequency and adequacy of the gaps in vehicular traffic in relation to the number and size of school children at established school crossings. Since there is no established school crossing noted on Smith Street, other measures such as warning signs, flashers, school speed

zones, crossing guards, or a grade separated crossing should be considered before traffic control signalization. Also, if the school driveway is within 300 feet of Route 16, then signalization at that intersection should be looked at prior to signalization on Smith Street, since traffic movement along Smith Street would be restricted by such a signal. School bus traffic may be impacted by the additional volumes generated by the proposed development during the a.m. peak period, but is less likely during the p.m. peak period as peak school traffic is likely to occur earlier than peak commuter traffic in the area.

Additional Transportation Factors

The significant impacts of the additional traffic generated by the proposed development would be the additional congestion and increase in the deterioration curve of the pavement lifecycle. Congestion would noticeably increase as nearly one third of the traffic on Smith Street would be generated by the proposed development. Smith Street is currently classified as a local road and therefore is not eligible for federal aid under the Surface Transportation Program (STP). As a result, rehabilitation or reconstruction of the roadway when needed would be the town's responsibility.

There are currently no sidewalks on Smith Street. Sidewalks should be considered in the proposed development and in any future improvements of Smith Street considering the location of the Middle School and housing densities in the area.

Another consideration should be a connecting road from the proposed Julia Terrace to the existing Arch Drive. This would aid to decrease any delays at the intersection of the proposed Royal Oak Avenue with Smith Street by providing a second driveway to Smith Street from the proposed development. It would also provide improved access of emergency vehicles to the development.

Street lighting provides another area to consider relating to the proposed development. Potential residents of the development will benefit from street lighting but nearly the entire site will be clear cut based on the proposal, creating the potential for light pollution issues

with abutting residents and residents of Smith Street. At a minimum, street lighting should be included at the intersection of the proposed Royal Oak Avenue and Smith Street.

The Middletown Transit District's (MTD) Rural Route - F Portland/East Hampton currently provides four a.m. and two p.m. trips connecting Route 66 to Route 16 via Route 196 and Main Street. Since MTD is very service orientated, the potential exists to divert the existing route onto Flanders Road and Smith Street in an effort to service the proposed development if there is sufficient interest to do so. This would benefit commuters wishing to utilize public transportation and lessen private vehicle trips generated. Also, there is a Connecticut Park and Ride Lot at the intersection of Routes 66 and 16 in East Hampton. It has a capacity of approximately twenty-seven vehicles and is paved, lit, and has a telephone for commuters. It has an average usage rate of about 15%.

Additional Questions and Comments

Are stand pipes and hydrants for emergency service included as part of the water supply plan using the onsite wells that will supply water to the proposed development or will emergency water come from another source such as holding tanks, detention ponds, tanker trucks, etc.?

Can the housing market support the sale of single family detached dwelling units at such high densities? A market study on the salability of such a development might be helpful considering it is significantly different than surrounding subdivisions.

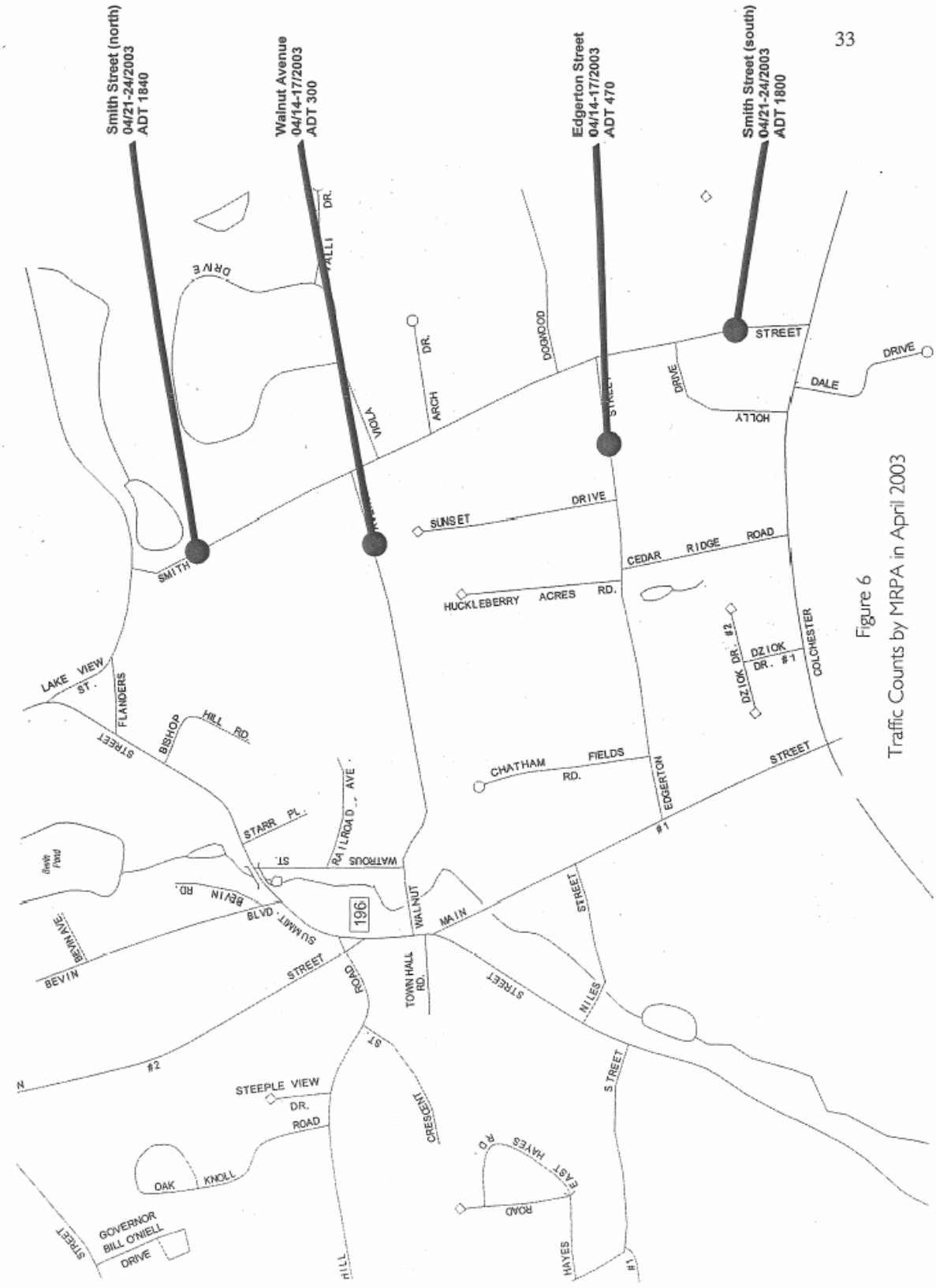


Figure 6
Traffic Counts by MRPA in April 2003

Figure 7
Traffic Counts by ConnDOT in 2000

Archaeological Review

A review of the State of Connecticut Archaeological Site files and maps shows no known archaeological site listed for the project area. However, cultural resources do exist on the property. For example, the proposed subdivision abuts the historic Airline Railroad, which has recently been developed into a trail system. This industrial site was built in the late 19th century. In addition, the high, flat topography suggests a high sensitivity to undiscovered Native American encampments. Historically, the area was farmland throughout the 18th and 19th centuries.

The Office of State Archaeology recommends an archaeological reconnaissance survey for the project area to identify other cultural resources which might be effected by the proposed undertaking. This survey should be conducted to identify all cultural resources in the area planned for development and provide recommendations on their significance and preservation strategies. The survey should be conducted in accordance with the Connecticut Historical Commission's Environmental Review Primer for Connecticut's Archaeological Resources.

The Office of State Archaeology looks forward to working with the Town of East Hampton and the applicant in providing any technical assistance in the conservation and preservation of its cultural resources in the project area.

The Natural Diversity Data Base

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

Natural Diversity Data Base information includes all information regarding critical biologic resources available to us at the time of the request. This information is a compilation of data collected over the years by the Environmental & 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.

Appendix

For Appendix Information please contact the ERT Office at 860-345-3977

ABOUT THE TEAM

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

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

PURPOSE OF THE TEAM

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

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

REQUESTING A REVIEW

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

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