

Pin Oaks



Municipal Golf Course

Eastern Connecticut Environmental Review Team Report

Eastern Connecticut Resource Conservation & Development Area, Inc.

Pin Oaks Municipal Golf Course



Middletown, 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
Inland Wetlands and Watercourses Agency
Middletown, Connecticut**

July 1998

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Acknowledgments

This report is an outgrowth of a request from the Middletown Inland Wetlands and Watercourses Commission to the Middlesex County Soil and Water Conservation District (SWCD). The SWCD referred this request to the Eastern Connecticut Resource Conservation and Development Area (RC&D) Executive Council for their consideration and approval. The request was approved and the measure reviewed by the Eastern Connecticut Environmental Review Team (ERT).

The 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 Thursday, June 23, 1998.

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I would also like to thank Jim Sipperly, environmental planner for the City of Middletown, Mark Quattro, developer/applicant, Robert Fusano, landowner, and Richard Jacobson, wetland/environmental consultant 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 additional plans and information. 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 City and landowners. This report identifies the existing resource base and evaluates its significance to the proposed development, and also suggests considerations that should be of concern to the City and applicant. 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 golf course.

If you require additional information please contact:

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Introduction

Introduction

The Middletown Inland Wetlands and Watercourses Agency (IWWA) has requested assistance from the Eastern Connecticut Environmental Review Team in reviewing a proposed 18 hole municipal golf course.

The 246.4 acre site is located on Mile Lane and is composed of three properties (the City of Middletown parcel, the Tuttle Road Associates parcel and the Czaja parcel) and an easement granted to the developer by the Middletown Board of Education. The golf course project has a long history dating back to the original 1968 purchase of the City of Middletown parcel (187 acres). An ERT report was completed in December 1995 (The Middletown Golf Club ERT Report) for a prior golf course application which was denied a permit by the Middletown IWWA. The IWWA asked the developer to look at several alternatives. Subsequent to that denial the developer has been able to add additional property and the school land easement to the project area for the current proposal of the golf course now known as "Pin Oaks." The layout, design, impacts and mitigation proposed have changed since the 1995 ERT review and report.

Wetlands on the site comprise 118.4 acres or slightly more than 48% of the total land area. The new proposal eliminates several encroachments into sensitive areas such as the vernal pools and West Swamp Brook. Direct wetland impacts total 11.14 acres for filling, grading and selective clearing and 13.3 acres will be affected by activity in the 50 foot setback area. There will be three conservation easement areas which total 82.45 acres according to the plans.

Objectives of the ERT Study

The Commission has asked for a study to provide supplemental review based on the new plans submitted with regard to wetlands, water quality, erosion and sediment control, wildlife resources, fisheries resources, open space, land use and archaeological sensitivity.

The ERT Process

Through the efforts of the planning Commission this environmental review and report was prepared for the City of Middletown.

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 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.

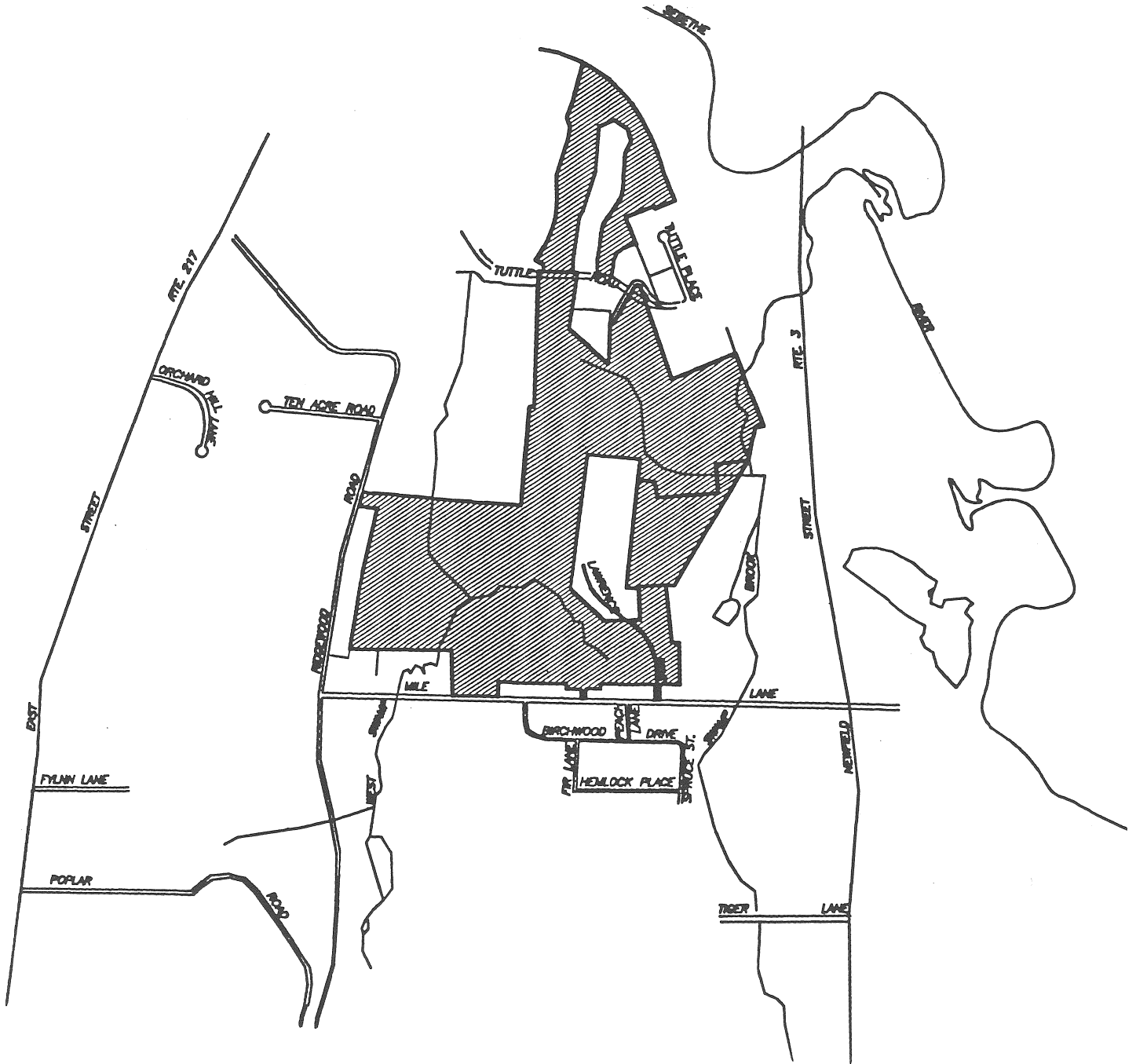
The data collection phase involved both literature and field research. The field review was conducted on Tuesday, June 23, 1998 and some Team members made additional site visits. The emphasis of the field review was on the exchange of ideas, concerns and recommendations. Being on site allowed Team members 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.

Location Map
NTS

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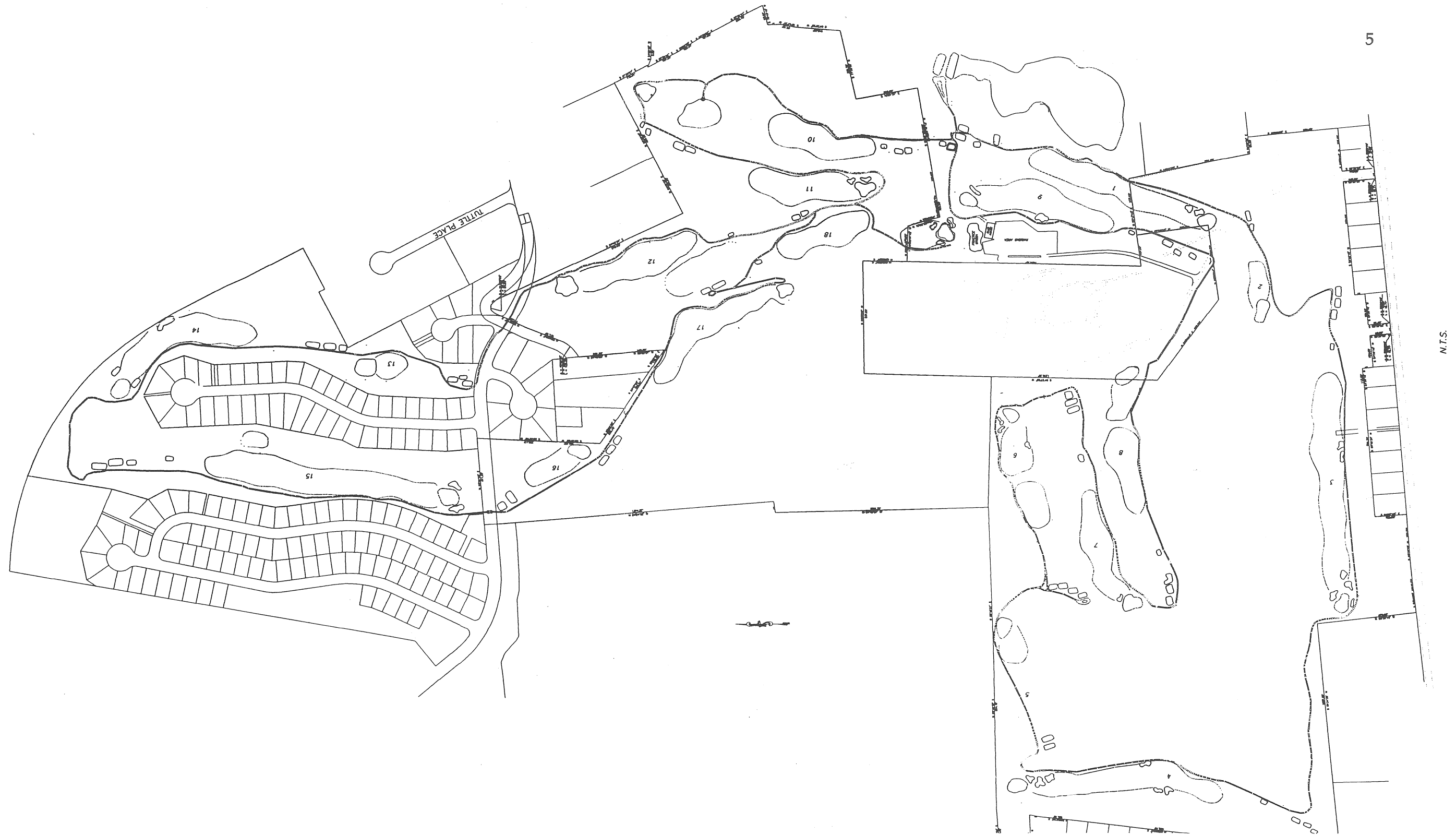


Figure 3.

Golf Course Layout
NTS

Soil and Water Conservation District Review

Plans reviewed for this section include those dated 4/23/98, updated by the project engineers on 6/30/98.

This Team member participated in the ERT for the original project proposal in the fall of 1995. As she previously stated, this project is located within the Mattabesset River watershed, and all stormwater from the site drains to the river. The underlying geology of the area is a combination of glacial till and glacial lake clays (from glacial Lake Middletown). When this fine grained material is disturbed and transported by stormwater, it takes a long time for the fine materials to settle out of suspension. For these reasons, it is extremely important that minimum areas are disturbed and exposed for any length of time.

The following comments and recommendations pertain to the Erosion and Sediment (E&S) Control Plan specifically and the plans in general.

1. On Sheet 8, General Sequence of Construction, add to Point 4 that topsoil stockpiles need to be located *away* from all wetland and watercourse areas. In Point 8, it should be added that any dewatering of the foundation should be done in an *upland* area.
2. On Sheet 9, the Construction Sequence for Erosion Control Area 1, Point 6 should be followed by Points 10 and 11, because there should not be any waiting time between grading the fairways and greens and their final seeding and stabilization.
3. There is proposed to be disturbance in the wetlands for the construction of Holes 5, 6, 7, and 8, with probably at least vegetation removal and rough grading before turf can be established. It will be difficult to stabilize this area if it is very wet. It will also be difficult to work in the areas of Holes 10 and 11 in the wetland and clay soil areas. Once these soils are disturbed, they are difficult to stabilize, and fine particulates can be transported a great distance.
4. If the plans call for the use of geotextile materials, then the E&S detail sheet should show information on the proper installation and maintenance of these types of controls.
5. It is hard to check for the appropriate layout of E&S controls when the symbol for the wetland limit is so difficult to see on the plans. It needs to be more distinctive. It is recommended that the same "notched" symbol be used on the E&S sheets as on the wetland disturbance sheets.

6. The use of earthen berms should be shown to direct stormwater away from sensitive wetland or watercourse areas in each of the E&S management areas.
7. On Sheet 9, additional E&S measures should be added on the south side of Hole 2 in the area of the cart path. This should remain in place until the site is stabilized, and then the rest of the work on the cart path can be completed.
8. On Sheet 10, proposed soil stockpile areas should be located on the plans. These should be located away from wetland and watercourse areas.
9. On Sheet 11, there should be a soil stockpile/dewatering area located on the plan for use while constructing Pond 3. As with the other stockpile areas for the ponds, one row of silt fence is probably not going to be enough protection. The developer needs to ensure that the soil materials effectively remain on site until they are dewatered enough to move to another location for use. These materials will take a relatively long time to dewater due to their high clay content. The project managers may want to use, in addition to traditional controls, a *vegetated* earthen berm around each stockpile area to help contain the muddy water. Infiltration of water from these soils will be difficult in this area due to the high clay content in the underlying materials. Where will this dewatered dredge material be used as fill? How will it be properly stabilized?
10. In general, the Team E&S reviewer is very concerned about the amount of work proposed for the area on Sheet 11. Due to the high clay content in the underlying materials, this area will be very difficult to work with and difficult to manage during storm events once vegetation has been removed.
11. There should be E&S provisions made for the Pond 2 spillway during the time of pond construction. This pond spillway will be a major source of sediment leaving the site during a storm event and should be managed very carefully.
12. On Sheet 12, earthen berms and a sedimentation basin should be installed at the north end of Hole 15 on the south side of the wetland crossing before water drains off the site towards the Mattabesset River. On the north section of that hole north of the crossing, care should be taken so that the silt fence doesn't run downhill and direct flow to the stream. E&S controls should be installed across the cart path area until the area is stabilized, and then the cart paths can be completed.

13. Silt fence should be curved around the northwest side of the Hole 14 green to keep stormwater flow away from the central wetland.
14. Earthen berms and a sedimentation basin should be used just north of the Hole 14 tees in the area of the proposed soil stockpile.
15. On Sheet 19, for the Pond 2 outlet channel detail, what is meant by the note calling for "straw with net" lining?
16. It is recommended that work on the ponds be completed as individually as possible, allowing for the maximum amount of pond and site stabilization as possible before connecting the ponds. As Pond 2 has a spillway, care should be taken that each of the ponds is stable and not contributing sediment laden water for discharge at the spillway.
17. The detail for the installation of hay bale berms is not correct. Additional hay bales should not be placed on top of others or trapped sediment "before sediment tops the first bales." Proper maintenance of hay bale berms calls for the removal of sediment from behind the berm when it is about half way up the berm. In general, hay bale berms are not recommended for use as much as rock check dams.
18. The detail sheet describes the use of infiltration trenches and scour holes. The use of these is a good idea, but where are they located for installation on the plans?
19. Construction should be limited to work during the late summer when the water table is low.
20. Given the size of the project, the developers will be required to register for a stormwater general permit for construction activities from the Connecticut DEP. Some of the information which should be provided at this time, as it will be required as part of the permit's stormwater pollution prevention plan, include the following:
 - Design calculations that show that sedimentation basins have been sited and designed properly;
 - Detailed plans for managing the site should construction fall outside of the seeding dates;
 - A checklist for regular inspection and maintenance of E&S controls and stormwater BMPs during and after construction;
 - Information from the drainage calculations showing that the post construction discharge will not contribute to scour of the adjacent streams or the Mattabesset River;
 - Information on temporary seeding mix should be on the plan.

21. Details should be provided on the specifics of the wetland planting plans for the ponds and cross sections for the ponds.

Wetland Review

The Team wetland specialist reviewed an earlier version of this proposal and his comments were published in the 1995 ERT report. This section contains comments on how the revised plans address the concerns raised in the 1995 report and additional concerns raised as a result of the revisions.

1. The Team wetland specialist's primary concern regarding impacts to vernal pools has been alleviated somewhat by removing all proposed activity from the vicinity of the "throat" area. His suggested 130' setback which appears to have been observed, should be considered a bare minimum. Research is confirming that amphibian migration routes may extend for much greater distances from their host vernal pools. Proposed activities are now confined to the north and south of the vernal pool area. These activities include conversion of existing "wet thicket" and "mixed hardwood forest", some of it wetlands, to fairways, holes and tees. If this application is approved, current vernal pool research efforts, ongoing at this location, could be extended to include a study on how these land altering activities affect the resident amphibian populations.
2. It appears that the current proposal has reduced direct impacts from 32% of the total wetlands acreage present on the site to that of 10%. This represents a significant reduction.
3. Adequate compensation for the eleven (11) acres of wetland impacts is still not evident. The overall social benefits of the planned golf course as compared to the greatly reduced, yet still significant wetland impacts, do not seem to justify leniency on the standard wetland compensation guidelines recommended in the 1995 report.
4. The applicant has not yet placed the FEMA Flood Hazard Area and Floodway Area boundaries on the plan.
5. No groundwater monitoring has been proposed as previously recommended. Water quality monitoring is limited to five stream locations. The Team wetland specialist has some concerns with the frequency and duration of the monitoring program. What is the basis for sampling only two weeks after fertilizer/pesticide applications? It is stated the sampling will be done for one year after stabilization yet there is no statement of sampling frequency. It is recommended that the monitoring program be forwarded to the CT-DEP Pesticides Group for possible further review and comment.

6. Wetland boundaries near construction areas, as well as clearing limits, should be clearly marked in the field prior to construction.
7. The wetland activity table on sheet 3 does not appear to include the construction of Pond #2 as an impact, albeit a conversion of one wetland type to another.
8. The isolated wetland to the west of the proposed practice area appears to be a very healthy and diverse swamp/marsh/open water habitat. With no observed inlet and outlet this feature may also be a vernal pool, even though it is most likely a permanent waterbody and not surrounded by forest like the others to the west. It is recommended that the applicant investigate this possibility. Even if this proves not to be a vernal pool, it is recommended that there be more separation between it and the practice field in order to create a buffer from this activity.
9. The boundaries of the Conservation Easement Areas should eventually be assigned meets and bounds so that they may be recorded on the deed. Ideally these areas should also be indicated in the field with appropriate signage.
10. The applicant is encouraged to contact Paul Capotosto at (860) 642-7239 or Ron Rozsa (860) 424-3034 of the DEP for information concerning Phragmites (Common Reed) control.
11. It is recommended that the applicant include cross-sections for the three proposed ponds which will show bottom slopes and extent of the shallow marsh creation areas. Currently proposed grading suggests that the ponds's edges will have a slope of approximately 2:1. Proper sloping for marsh creation should be in the range of 6:1 to 4:1. In addition, the applicant should comment on what effect, if any, the periodic introduction of relatively cold, pumped groundwater will have on the wetland plants in these created ponds.

Wildlife Resources

General Background

The 187.2 acre parcel of land owned by the City of Middletown and additional 59.5 acres being considered for development as a golf course provides diverse wildlife habitat in an urbanizing area. The diversity in wildlife habitat is directly linked to the diversity of the eight plant communities located on the property.

Wildlife Observations/Site Inspection

Wildlife observed utilizing the Czaja (west) property and other proposed golf course areas on the city-owned land during the site visit on June 23, 1998 were: *gray catbird (*Dumetella carolinensis*), *yellow warbler (*Dendroica petechia*), song sparrow (*Melospiza melodia*), *American robin (*Turdus migratorius*), northern cardinal (*Cardinalis cardinalis*), and *red-winged blackbird (*Agelaius phoeniceus*), prairie warbler (*Dendroica discolor*), common yellowthroat (*Geothlypis trichas*), blue jay (*Cyanocitta cristata*), tree swallow (*Tachycineta bicolor*), northern mockingbird (*Mimus polyglottos*), woodthrush (*Hylocichla mustelina*), eastern phoebe (*Sayornis phoebe*), chestnut-sided warbler (*Dendroica pennsylvanica*), American crow (*Corvus brachyrhynchos*), wild turkey (*Meleagris gallapavo*), gray squirrel (*Sciurus caroliniana*), eastern cottontail (*Sylvilagus floridinus*), white-tailed deer (*Odocoileus virginiana*), American toad (*Bufo a. americanus*), and green frog (*Rana clamitans*), [*=observed nesting behavior]. Observed meadow vole (*Microtus pennsylvanicus*) activity in the field habitat. A more detailed review of the property during the four seasons of the year would, undoubtedly, reveal additional wildlife use of the property.

Conversion of Predominantly Woody Plant Communities to Open and Mowed Habitats

In general, the conversion of predominantly wooded plant communities to open and mowed habitat will be detrimental to most forest-dwelling and shrub-swamp-dwelling wildlife currently occupying the site. A predictable shift in the type of wildlife communities occupying the property will occur. Species such as the Canada goose (*Branta canadensis*), red fox (*Vulpes vulpes*), woodchuck (*Marmota monax*), Eastern cottontail, European starling (*Sturnus vulgaris*), house sparrow (*Passer domesticus*), brown-headed cowbird (*Molothrus ater*), and other generalists will benefit from the habitat changes. Wildlife that are considered specialists (i.e. neotropical migrants) are more sensitive to the effects of development and will be the most adversely affected by the proposed development. Other wildlife that may be negatively affected

from the proposed habitat changes will be the amphibians which thrive best in areas with abundant woody plant debris on the ground and clean unaltered water sources.

Discussion of Wildlife Species Changes

The wildlife species that are likely to benefit from the open and mowed habitats of this proposed development are, today, considered nuisances in many parts of the state. In particular, the Canada goose has been associated with causing nuisance situations on golf courses. They congregate in large numbers, feed on turf grasses, nest on open water ponds, get in the way of golfers, and leave large volumes of feces in and around the greens and waterbodies. Other detrimental wildlife species that benefit from open and mowed areas are Brown-headed cowbirds which parasitize the nests of other birds which leads to lower recruitment of young especially for many area-sensitive songbirds that are already declining due to forest fragmentation.

On pages 8 and 9 of the Pin Oaks Municipal Golf Course Report (April 19987) it is stated in the wildlife habitat section that "...the brook corridor and the ponded areas within the wooded wetland offer only open water in immediate area limiting the value of the site for many waterfowl and wading birds." The report also emphasizes that current conditions of a wooded swamp and shrub thicket wetlands supports fewer overall wetland species than marshes. Although waterfowl and wading bird habitat is currently limited on the site, it is because of the natural existing features of the property. Creating a better environment for waterfowl and other wading birds will require habitat alteration and creation of a marsh system. Man-made systems may mimic some of the functional values of natural marsh systems but their long term effectiveness and integrity is still being evaluated by researchers.

As the abandoned farm fields of the property get older and forest succession continues, the juxtaposition of the wetlands (scrub thicket and wooded swamp) and the forest uplands will enhance conditions for some forest wildlife species. Also, there is a possibility of Beaver (*Castor canadensis*) moving in to the area and influencing the vegetation in the future.

Although the upland forested area with the majority of vernal pools is being protected from development, it is important to also maintain foraging habitat. Some of the obligatory vernal pool species require older forested areas for foraging during their adult stage. As the abandoned farm fields grow older, they will increase in value as foraging areas for amphibians. A limited study of breeding amphibians was done by Hank Gruner. A follow-up study is needed to determine the dispersal of emerging young from the vernal pools. This may help identify movement corridors and foraging habitat. Reptiles and amphibians are slower at moving between habitat types and are less tolerant of habitat alterations. Although paved areas are avoided in much of

the golf course plan, there is still proposed extensive removal and alteration of existing habitat types.

A breeding survey bird survey of the property including recently added areas should be made to determine abundance and types of breeding birds. There are many scientific studies in wildlife ecology that indicate a strong relationship between small forests and high human use leads to declining function as meaningful reserves for area-sensitive (wildlife that require larger unbroken parcels) wildlife (Bond, 1957, Levenson 1981, Hohne 1981, Askins et al. 1987). As forest and habitat sizes shrink in size, they are less viable as breeding places for interior forest birds and an increase in predation and parasitism of nests occurs (Blake and Karr 1985).

Open Space, Wildlife Habitat and the Future

Connecticut is the fifth most densely populated state in the United States. As urban areas become developed, habitats are divided into smaller and more isolated pieces. Land that is in public ownership can be maintained and managed for the long term. In contrast, private land, which makes up 88 percent of the land in Connecticut, usually changes ownership and is not managed for wildlife for the long term. The current proposed golf course will significantly alter or reduce the size of the natural habitat types found on this city owned property. As forest fragmentation continues, city-owned natural areas will gain in importance as wildlife habitat and refugia. Retaining natural areas in close proximity to urban centers serve as refugia for wildlife and are also gaining in popularity nationwide. Public opinion survey of urban residents of five metropolitan centers in New York State indicated that 96 percent of the respondents felt that it was important for their children to learn about nature and 73 percent were interested in wildlife in their backyard or neighborhood area (Brown et al. 1989).

Management Recommendations

Impact #1

On page 2 of 20 of the *Wetlands Disturbance Plan for Pin Oaks Municipal Golf Course*, golf holes #6, 7, and 8 require filling of wetlands and wetland buffers. They are configured in an east-west fashion criss-crossing the wetland area. The wetland impacts include activities 6-A, 6-B, 6-C, 7-A, 7-B, 7-C, 7-E, 8-A, 8-B, 8-C, and 8-E. The valuable vernal pool area surveyed by Hank Gruner is joined to this area from the north. Although part of this area is currently being mowed and maintained in short grass conditions, it would become wet meadow and eventually forested if allowed to stay in its natural condition.

Recommendation to Reduce Impact #1

Reconfigure holes and eliminate some to reduce impacts. There exists a corridor of non-wetland area which is configured in a north-south fashion

(this corridor now has part of the tees and greens of golf holes #6, 7, and 8 planned. One hole can be configured in a north-south fashion to eliminate the wetland impacts (see Figure ____). There is a need to find other options to build the eliminated two holes on additional property (i.e. Czaja property on the east side of East Swamp Brook) or reconfigured on existing property.

Impact #2

On page 3 of 20 of the *Wetlands Disturbance Plan for Pin Oaks Municipal Golf Course*, golf holes #10 and 11 require disturbance and alteration of wetlands and wetland buffers. Building artificial ponds will also cause disturbance and alteration of the natural wetlands soils and vegetation. Wildlife associated with wooded wetlands will be displaced by the new ponds and manicured lawns.

Recommendation to Reduce Impact #2

Reconfigure or eliminate holes #10 and 11 to reduce impacts to wetlands and associated wildlife habitat.

Salvage Existing Native Vegetation

In addition to reducing the sizes of golf holes wherever practical and feasible, replanting areas with native trees, shrubs and wildflowers can help reduce negative impacts. Native plantings are more valuable to wildlife. Salvaging existing woody vegetation can be accomplished by digging and balling them for future planting in and around the golf course. Select plants can be dug during the dormant periods. Examples of existing woody plants that can be dug and replanted are: arrowwood viburnum (*Viburnum recognitum*), silky dogwood (*Cornus amomum*), highbush blueberry (*Vaccinium corymbosum*), sweet pepperbush (*Clethra alnifolia*), and Virginia rose (*Rosa virginiana*) or pasture rose (*Rosa carolina*).

Educational Value of the City-Owned Property

With an elementary school adjoining the open space property, the natural areas offer a unique educational opportunity. Nature trails and outdoor learning areas can be constructed throughout the various habitat types. Many of Connecticut schools are utilizing nearby or adjacent property in developing outdoor nature classrooms (Picone, personal observation).

Summary

Building a golf course requires major alteration of existing natural vegetation, soils, and topography. Inherent with these changes are the expected changes to wildlife and habitat currently found on the property. It is difficult to recommend minimizing the impacts from habitat alteration without

requesting significant reductions of golf holes or green sizes. This section has suggested some changes in configuration of some of the golf holes and elimination of others to reduce wildlife resource impacts and for use as a guides for the other golf holes that require wetland alteration or filling. Connecticut has already lost a significant amount of inland wetlands and the wetlands on the proposed golf course area are of high quality and benefit a diversity of wildlife in the Middletown area.

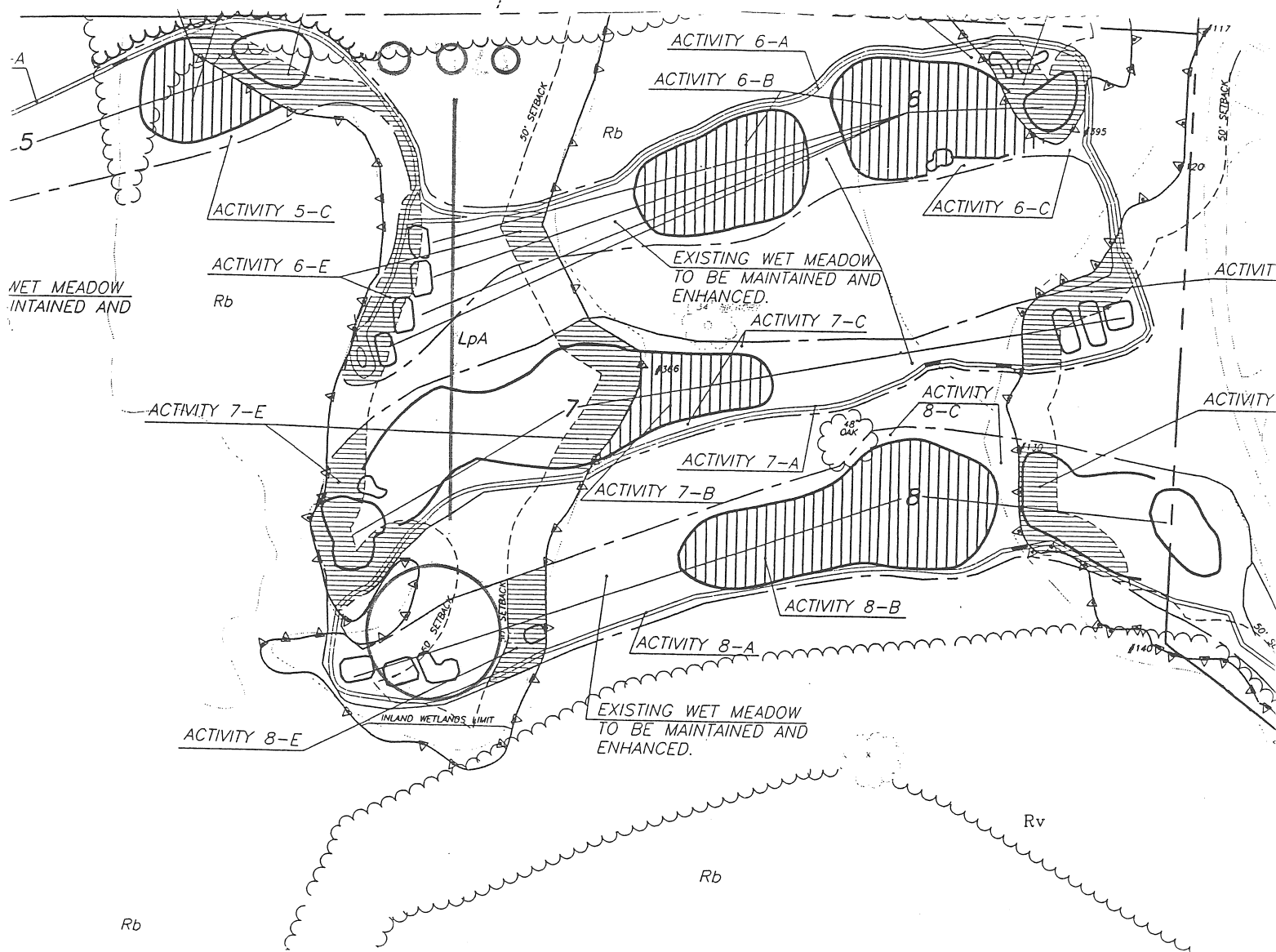
Additional land should be sought to reduce the amount of wetland wildlife habitat being negatively impacted. Although some additional land was added to the golf course proposal since the last application, there is still significant negative impacts to wetlands and their associated buffers. If additional land is sought, it should contain a better ratio of dry upland to wetlands. Currently, the golf course is proposed to be built on land with approximately 50 percent of it being wetlands.

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Figure 4.

Reconfigure Hole #6 and eliminate Holes #7 and #8.
Illustration from Pin Oaks Municipal Golf Course Plan, page 2 of 20.

Hole #6

The Natural Diversity Data Base

The Natural Diversity Data Base maps and files regarding the project have been reviewed. According to our information, three state listed plant species have been documented from the area in question. They are *Pedicularis lanceolata*, Swamp lousewort - State Special Concern; *Carex squarrosa*, Sedge - State Special Concern; and *Agrimonia parviflora*, Small-flowered agrimony - State Special Concern. The Team biologist with the DEP-Natural Resources Center has had conversations with Michael Klein, a consultant working with the developer, regarding a summary of impacts to these species and a proposed mitigation plan. She has not yet received this information (6/19/98).

Our records also indicate that *Oxalis violacea*, Violet wood-sorrel occurs north of the site in question. This population is associated with the Mattabesset River floodplain. It is unlikely that this population will be affected by proposed activities. However, if water diversions or other activities that would affect the floodplain areas are considered please contact Nancy Murray at the DEP -Natural Resources Center.

Natural Diversity Data Base information includes all information regarding critical biologic resources available to us at the time of the request. This information is a compilation of data collected over the years by the Natural Resources Center's Geological and Natural History Survey and cooperating units of DEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. 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.

It is now possible for individuals to conduct an initial endangered species review using the "State and Federal Listed Species and Significant Natural Communities" maps available for viewing through each town's Town Hall. The Town Planner should have a copy of the map and instructions on how to use the maps. This map shows the generalized locations for listed species and communities as gray-shaded areas on a 1:24,000 scale map of the town.

Fisheries Resources

Fisheries comments provided in the 1995 ERT Report entitled "The Middletown Golf Club, Middletown, CT" are still pertinent to the new proposal known as "Pin Oaks Municipal Golf Course." Below are comments specific to the new proposal.

Reduced streamflow in West Swamp Brook and East Swamp Brook may still be a concern at this site. The loss and alteration of more than 11.4 acres of wetlands that supply ground and surface waters to these watercourses may effectively reduce stream flows in addition to the actual withdrawal of groundwaters from man-made ponds used for irrigation purposes. The latest hydrologic report states that irrigation water will be withdrawn from a bedrock well which is not expected to significantly impact the overburden water table. Thus, streamflows and wetlands are not expected to be negatively impacted by golf course irrigation. The validity of this conclusion will be verified and analyzed when the applicant submits reports and data in support of a water diversion permit with the CTDEP.

If it is determined that this water diversion impacts adjacent watercourses, then more information may be required to determine actual instream habitat loss and acceptable flow requirements. Determination of acceptable flow requirements can be accomplished either by applying the New England Aquatic Base Flow Methodology or by conducting a site specific flow/habitat study approved by the Fisheries Division. The Fisheries Division has adopted the New England Aquatic Base Flow (NEABF) policy established by the US Fish and Wildlife Service that prescribes instream flows allowable for hydropower, water supply, flood control and other water development projects. The NEABF standard calls for maintaining "instream base flows" of 0.5 cfs/m (cubic feet per square mile of drainage area), or the median August flow as that data conforms to predetermined criteria.

Archaeological Review

A review of the State of Connecticut archaeological site files and maps shows one known archaeological site in the project area. This prehistoric Native American encampment is located in the southern portion of the project area along West Swamp Brook. The site has yielded stone tool artifacts of quartz and flint representing four thousand years of seasonal occupation by Indian groups migrating through the Mattabessett and Connecticut River drainages. While listed as a campsite, this occupation is of importance due to the presence of Late Woodland projectile points and a sandstone digging hoe which may indicate a combined subsistence base including hunting and horticulture. This site and others in the area may yield important information on the shift from hunting and gathering to horticultural societies around 1,000 years ago.

There are also 12 archaeological sites located in very close proximity to the project area. Those archaeological sites consist of three (3) prehistoric Native American encampments as well as four (4) 18th century farmsteads and three (3) 19th century industrial mill complexes. The project area possesses a great sensitivity for archaeological resources. Undisturbed land associated with the wetlands that intersect the property should yield undiscovered archaeological resources in the area.

The Office of State Archaeology strongly recommends an archaeological survey for the golf course property prior to any construction activities. This survey should locate any archaeological resources which exist there and provide for mitigative measures as the golf course proposal proceeds. The Office of State Archaeology is prepared to provide any technical assistance to the Town of Middletown as well as to the developer/property owners in accomplishing the recommended survey.

The Golf Course as a Land Use

Note: The Team planner was asked to address golf courses as a land use and was not asked to address the environmental issues which are discussed by other Team members.

Golf courses as a land use ranks high on the scale of desirability from a number of points-of-view. The following are summaries of the various benefits:

1. Creates managed open space. The development of the course will result in 204.5 acres of City owned and maintained open space. Currently the City has 187 acres which is subject to illegal hunting and disposal of "junk" creating unsightly or possibly dangerous conditions.
2. Creates permanent open space. Most, if not all applications for golf courses contain provisions for permanent open space or areas subject to conservation easements. The Pin Oaks project proposes that some 80.5 acres be governed by such easements.
3. Creates major green space. Most eighteen hole projects need between 250-300 acres as a minimum. These areas separate existing and future developments and enhance their value by the preservation of green space which uniquely define these developed areas.
4. Creates significant tax revenues with limited demand for municipal services. An eighteen hole golf course should have an assessed value in current dollars, of at least 1.8 million dollars without including a clubhouse and related facilities. There are no direct educational costs related to a golf course and minimal emergency or public works service. Utility costs are borne directly by the facility. The ratio of tax dollars generated when compared with the cost of services are probably better than that of industrial and commercial development.
5. Creates employment opportunities. There will be significant temporary employment created during the construction phase of the course along with its two maintenance buildings and pro shop. Once completed the staffing of the facility will require a wide range of skill levels on a year-round and seasonal basis. Requirements for extensive environmental monitoring and evaluation of best management practices will also be an on-going employment opportunity.
6. Minimal traffic impact. Unlike other land uses, golf courses do not generate high a.m. or p.m. peaks. Patrons arrive and depart on a steady basis with

approximately 32 cars per hour entering or leaving the site during the first and last 1/3 of the golf day. During the middle 1/3 this number will double to 64. Even with employee and vendor traffic added to these numbers the impact is minimal for the land use.

ABOUT THE TEAM

The Eastern Connecticut Environmental Review Team (ERT) is a group of professionals in environmental fields drawn together from a variety of federal, state and regional agencies. Specialists on the Team include geologists, biologists, foresters, 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.