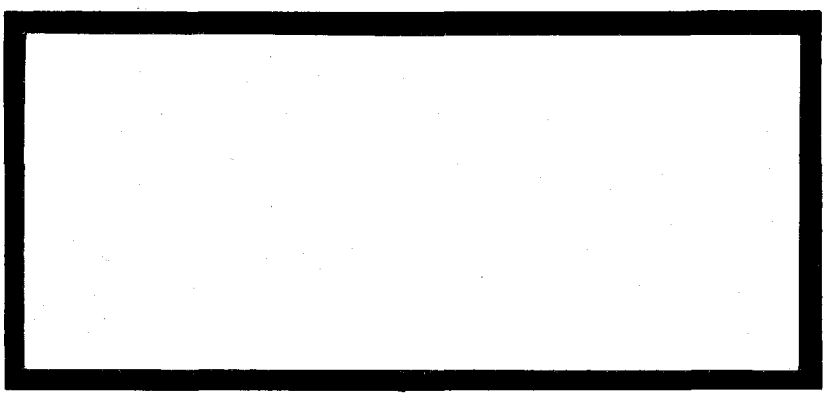
Hillsborough Litigation 6/28/96

Report: Environmental Impact Assessment for Greenbriar at the Village, Phase I

Pgs. 167

HI0000020E



EcolSciences, Inc.
Environmental Management & Regulatory Compliance

ENVIRONMENTAL IMPACT ASSESSMENT
FOR
GREENBRIAR AT THE VILLAGE, PHASE I
TOWNSHIP OF HILLSBOROUGH
SOMERSET COUNTY, NEW JERSEY

Prepared for:

US Home Corporation, NJ Division
800 W. Main Street
Freehold, NJ

Prepared by:

EcolSciences, Inc.
75 Fleetwood Drive, Suite 250
Rockaway, New Jersey 07866

June 28, 1996

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

I. EXECUTIVE SUMMARY

US Home Corporation of Freehold, New Jersey, is proposing to construct 25 single-family homes on a 9.8-acre tract located north of Amwell Road in the Township of Hillsborough, Somerset County, New Jersey. The proposed residential subdivision is situated approximately four miles west of the intersection of Amwell Road and Route 206 on land previously cleared for agriculture. The 25-unit residential subdivision represents Phase I of a Planned Adult Community/Health Care Facility (PAC/HCF) that is anticipated to be constructed on a property zoned AG and totalling approximately 760 acres, consisting principally of active, fallow, and successional fields, divided by small patches of forest that remain in areas not suitable for cultivation. The Hillsborough Code indicates that a "PAC or PAC/HCF shall be a permitted use in the RA, AG, RS, R, R1, CR, AH, TC, and PD Residential Zone Districts." (§77-91.1D(1)). The Phase I residential subdivision is situated in the south central portion of the larger property.

Access to the residential subdivision will be from Amwell Road. The residences will be supplied with community water and sewer service, JCP&L will provide electrical service, while PSE&G will provide gas service. Stormwater runoff will be directed to a detention basin to the east of the access road; this basin will discharge treated stormwater to the headwaters area of Royce Brook.

The significant environmental impacts resulting from construction and operation of the residential subdivision as configured are anticipated to be the irreversible and irretrievable commitment of natural resources resulting from the change in land use; construction of the project will convert most of the upland portions of the Phase I project site from agricultural land to developed lots and access roadways. This is a commitment of natural resources made by the Township of Hillsborough in their recognition of the area around Mill Lane as suitable for a Planned Adult Community.

Construction of the proposed development will result in minimal changes to existing topography and stormwater quality, and a loss of some areas of upland, open-field wildlife habitat. The small wetland area on the project site will not be disturbed, although the applicant will apply to NJDEP for a transition area averaging plan to permit the access roadway to pass between two wetland areas. The addition of 25 residential units to the Township will have only nominal impacts on air quality, demography, traffic, and infrastructural services.

II. DESCRIPTION OF THE DEVELOPMENT PLAN

A. General Description

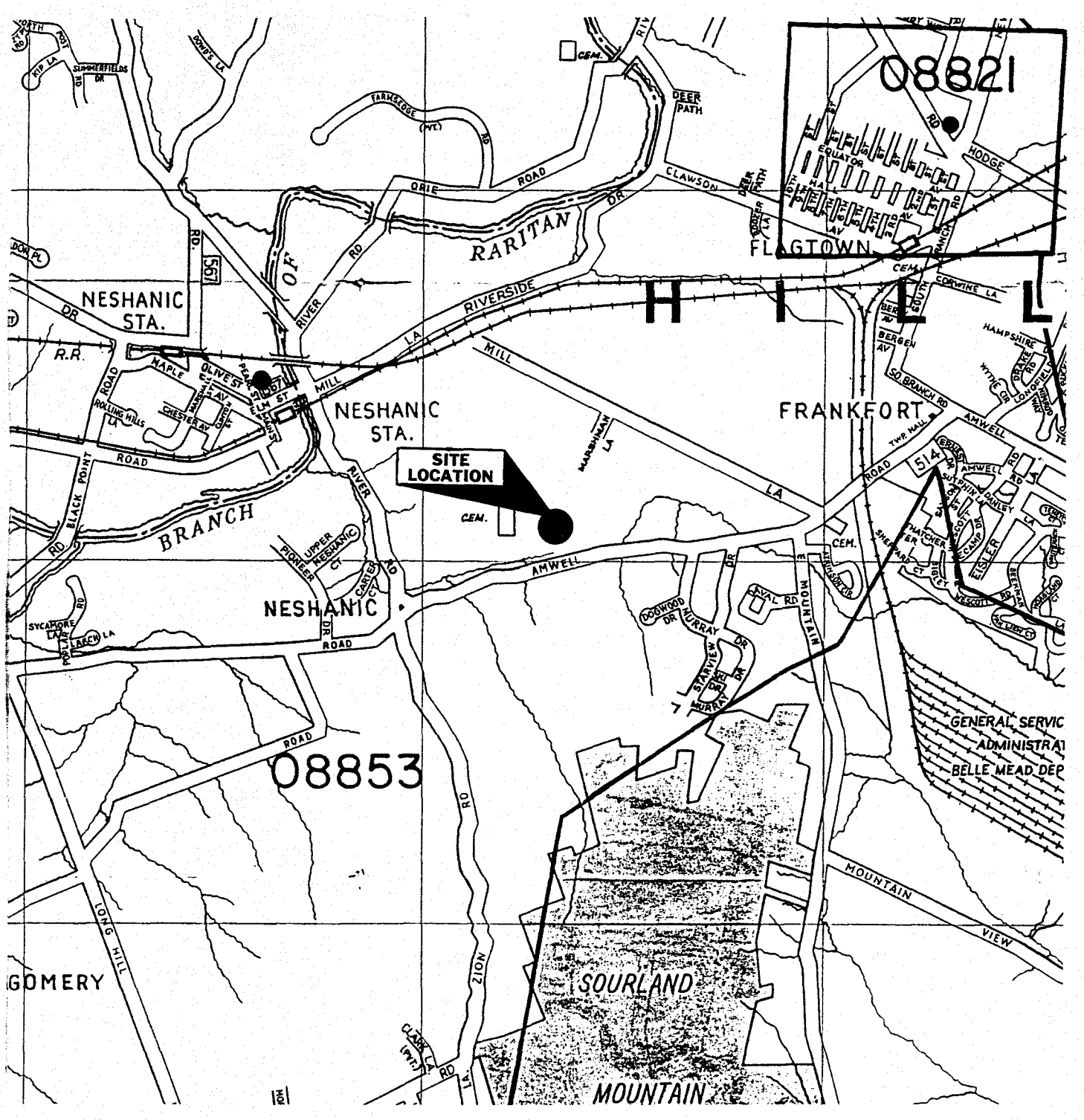
US Home Corporation of Freehold, New Jersey, is proposing to construct 25 single-family homes on a 9.8-acre tract located north of Amwell Road in the Township of Hillsborough, Somerset County, New Jersey (Figures 1 and 2). The proposed residential subdivision - Phase I of Greenbriar at the Village - is situated approximately four miles west of the intersection of Amwell Road and Route 206 on land previously cleared for agriculture. The 25-unit residential subdivision represents Phase I of a Planned Adult Community/Health Care Facility (PAC/HCF) that is anticipated to be constructed on a property totalling approximately 760 acres and consisting principally of active, fallow, and successional fields, divided by small patches of forest that remain in areas not suitable for cultivation (Figure 3). The General Development Plan (last amended September, 1995) for the full project has been approved by the Hillsborough Township Planning Board, and is shown as Sheet 3 of the Phase I plans submitted by Van Cleef Engineering Associates. The Phase I residential subdivision is situated in the south central portion of the larger property.

B. Zoning Boundaries

The subject property is situated within an Agricultural (AG) zone of the Township of Hillsborough. The Planned Adult Community option is defined as "a community having one (1) or more parcels of lands with a contiguous total acreage of at least two hundred (200) acres forming a land block to be dedicated for the use of a planned adult residential retirement community." (§77-91.1 of the Hillsborough Code). The Hillsborough Code further indicates that a "PAC or PAC/HCF shall be a permitted use in the RA, AG, RS, R, R1, CR, AH, TC, and PD Residential Zone Districts." (§77-91.1D(1)).

C. Sanitary Sewage

Domestic wastewater from the proposed 25-unit residential development will be discharged to the Township sanitary sewer system. The proposed internal sewer system will connect with an existing 12-inch sewer line within the alignment of Amwell Road as it passes to the south of the project site. Van Cleef Engineering Associates has estimated the wastewater generation of the 25 residences at 3,275 gallons per day (gpd).



QUADRANGLE LOCATION

N

FIGURE 1: REGIONAL LOCATION MAP

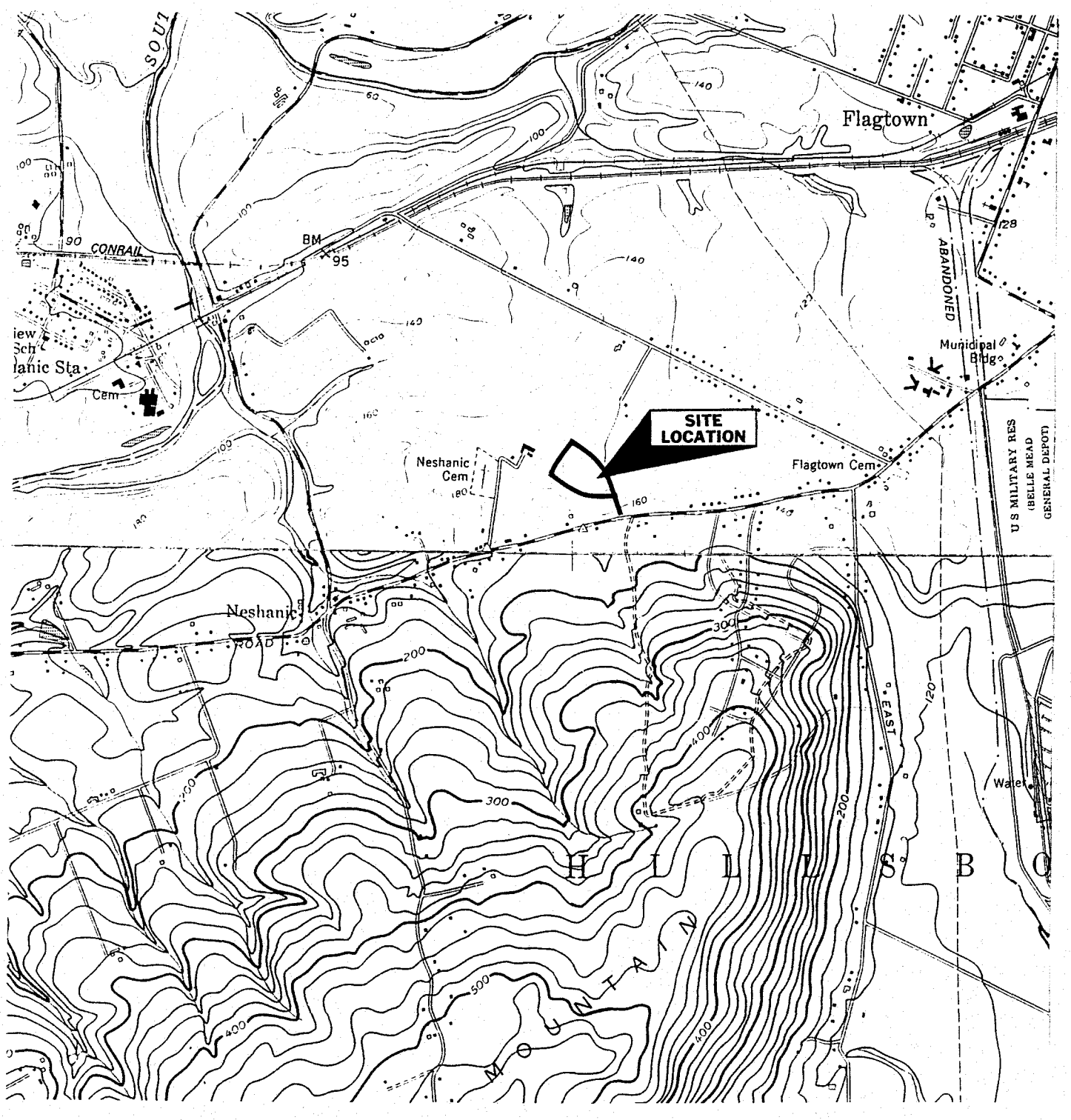
Greenbriar at the Village, Phase I
Block 11, Lots 27 & 34
Township of Hillsborough
Somerset County, New Jersey

Source : Hagstrom Map of Somerset County, NJ (1991)

US Home Corporation
Environmental Impact Assessment

EcolSciences, Inc.
Environmental Management & Regulatory Compliance

DATE : 6/25/96
SCALE : 1" = 2,700'
30-1545



QUADRANGLE LOCATION

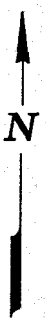


FIGURE 2: USGS TOPOGRAPHIC MAPPING

Greenbriar at the Village, Phase I
Block 11, Lots 27 & 34
Township of Hillsborough
Somerset County, New Jersey

Source : Rocky Hill (1970) and Raritan (1981), NJ, Quadrangles

US Home Corporation
Environmental Impact Assessment

EcolSciences, Inc.
Environmental Management & Regulatory Compliance

DATE : 6/25/96
SCALE : 1" = 2,000'
30-1545

QUADRANGLE LOCATION

N

FIGURE 3: SCS SOILS MAPPING

Greenbriar at the Village, Phase I
Block 11, Lots 27 & 34
Township of Hillsborough
Somerset County, New Jersey

Source : Somerset County Soil Survey - Sheet 28 (SCS, 1976)

US Home Corporation
Environmental Impact Assessment

EcolSciences, Inc.
Environmental Management & Regulatory Compliance

DATE : 6/25/96
SCALE : 1" = 1,320'
30-1545

D. Potable Water Supply

Potable water will be supplied to the residences by a water distribution system. An existing 24-inch water main is located within the alignment of Amwell Road as it passes to the south of the project site. Potable water in Hillsborough Township is provided by the Elizabethtown Water Company; demand is anticipated to be approximately 3,275 gpd.

E. Stormwater Management Facilities

Stormwater runoff from the internal roadways and driveways will be collected in a system of catch basins and storm sewers, and conveyed to a stormwater detention basin for treatment before discharge into the headwaters area of Royce Brook. The detention basin, situated to the east of the access road to the residential subdivision, will provide volume control such that the peak rate of discharge in the post-development condition is less than or equal to the peak rate of discharge in the pre-development condition for all design storms up to and including the 100-year storm.

F. Utilities Plan

As noted above, potable water and sewer services will be provided by the municipal infrastructure. Electric service will be provided by JCP&L, while natural gas service will be provided by PSE&G.

G. Solid Waste Plan

The residential subdivision will be a private community; solid wastes will be picked up by a private carter and conveyed to a solid waste facility for appropriate disposal.

III. INVENTORY OF EXISTING NATURAL RESOURCES

A. Geology and Topography

The portions of New Jersey that have similar sequences of rock types, geological structures, and geological history have been characterized as Physiographic Provinces - major areas of the state that have experienced specific geological histories and that have similar characteristics at present. From northwest to southeast across the State, the major physiographic provinces are: Appalachian Ridge and Valley, Highlands, Piedmont, and Coastal Plain. Each of these physiographic provinces has regional subdivisions, and each is also a continuation of larger regions in the northeastern United States (Widmer, 1964; Robichaud and Buell, 1973).

The Township of Hillsborough is situated in the Newark Triassic Basin, located with in the Piedmont Physiographic province (the "Piedmont"). In New Jersey, the Piedmont begins south of Suffern, NY, and runs southwest to the Delaware River, thus occupying the southeastern portions of Hunterdon, Morris, and Passaic counties, large areas of Somerset, Mercer, and Middlesex counties, and all of Union, Essex, and Bergen counties. The Piedmont is underlain by northwestward-dipping shales, siltstones, and sandstones of Triassic Age, and by intrusions of igneous basalt and diabase of Jurassic age. The Piedmont continues west through Pennsylvania into Virginia. The formations comprising the Triassic Basin in the Piedmont belong to the Newark Group, which consists of the Stockton, Lockatong, and Brunswick formations.

Somerset County exhibits four distinct geological regions, which are each reflected in the county's topography. The local division within Hillsborough falls is the Somerville Lowlands, underlain primarily by red shale, sandstone, and minor amounts of Kittatinny limestone.

The project site and surrounding area are underlain by red shale and sandstone of the Brunswick Formation, the most common rock type in northeastern New Jersey. The Brunswick Formation, estimated to be 6000 to 8000 feet thick (Widmer, 1964), was formed approximately 150 to 225 million years ago during the Triassic Period of the Mesozoic Era. Continental drift caused the creation of rift valleys, formed on the margins of the continent. The Newark Basin is one such rift valley, and dominated the area of Somerset County during this period, Material eroded from the surrounding highlands was, over time, deposited in this rift valley. Millions of years of floodplain deposits, renewed tectonic activity, and faulting resulted in the deepening of the basin and the creation of ancient Lake Lockatong. This lake once extended across all of

central New Jersey and eastern Pennsylvania. The lake eventually dried up, leaving extensive poorly-drained mudflats and sluggish drainages that were subsequently covered with the characteristic red, iron-rich sands, silts, and muds of the Brunswick Formation (NJDEP: Geologic Overlay Map Sheet 25, 1976; Somerset County Natural Resource Inventory, 1983). This formation occurs over most of the lowland region of the county.

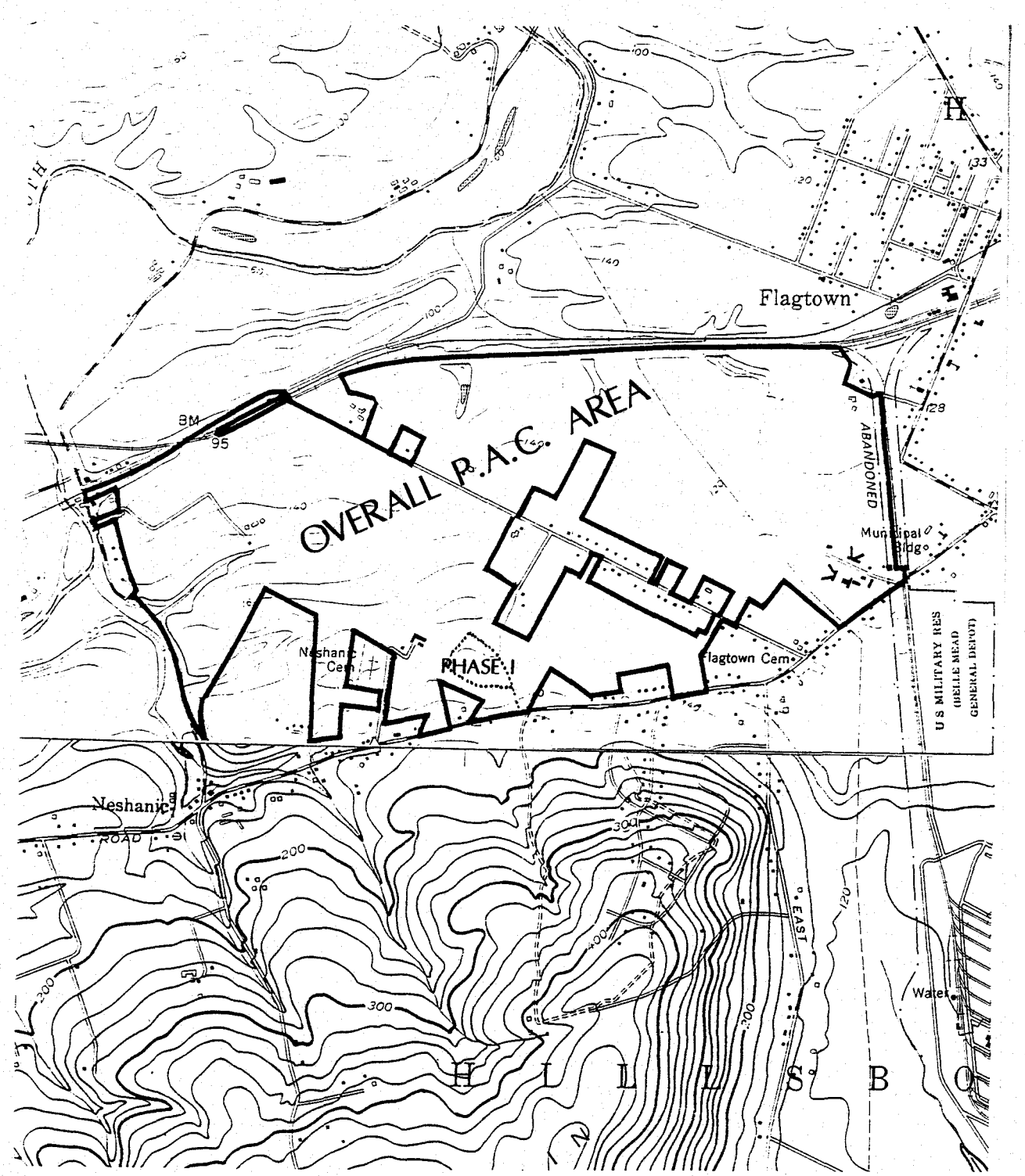
Topography within Hillsborough Township, except in the Sourland Mountain area, is flat to gently rolling. Virtually the entire township lies below the 200-foot contour (mean sea level). Sourland Mountain, located immediately south of the project site, is a long, whaleback ridge that rises to approximately 500 feet. The local topography of the project site exhibits generally low relief and is best characterized by low rolling hills and wide valleys. Steeper slopes are typically found along stream corridors.

Elevations within the project site range from approximately 100 feet in areas adjacent to small tributary streams to approximately 180 feet in the southern half of the site. According to Hillsborough Township's NRI (Map No. 5 - Steep Slopes), slopes in excess of 12 percent are considered to be "critical" slopes. The Phase I project site has nominal slopes of less than six percent.

B. Soils

Soils are formed through the interaction of a variety of physical, chemical, and biological factors that include climate, parent material, topography, biological activities, and time. The degree to which any or all of these factors affects the local soil characteristics is quite variable, generally leading to the formation of a mosaic of soil types in any particular locality. The United States Department of Agriculture has, through the Soil Conservation Service, mapped soils in detail; for New Jersey, the results of these soil surveys are issued for each county.

According to soils mapping contained within the Somerset County Soil Survey, prepared by the United States Department of Agriculture Soil Conservation Service (SCS, 1975; Sheet 28), two soil phases representing two soil series occur on the site (Figure 4): these are Penn shaly silt loam, 2-6 percent slopes (PnB), and Reaville silt loam, 2-6 percent slopes (ReB). The properties of these two soil series are tabulated in Table 1 and summarized below.



QUADRANGLE LOCATION

N

FIGURE 4: OVERALL P.A.C. AREA

Greenbriar at the Village, Phase I
Block 11, Lots 27 & 34
Township of Hillsborough
Somerset County, New Jersey

Source : Rocky Hill (1970) and Raritan (1981), NJ, Quadrangles

US Home Corporation
Environmental Impact Assessment

EcolSciences, Inc.
Environmental Management & Regulatory Compliance

DATE : 6/25/96
SCALE : 1" = 2,000'
30-1545

Table 1
Soil Characteristics, Limitations, and Suitabilities

PARAMETER	Penn shaly silt loam PnB	Reaville silt loam ReB
Texture	Shaly silt loam	Silt loam
Slope (%)	2-6%	2-6%
Depth to Bedrock (ft.)	1.5-3.5	1.5-3.5
Depth to Seasonally High Water Table (ft.)	>5	0.5-3.0
Permeability (in./hr.)	0.6-2.0	0.6-2.0
Available Water Capacity (in./in. soil)	0.14-0.26	0.18-0.24
pH	5.1-5.5	5.1-5.5
Erosion Hazard	Slight	Slight
Limitations for Dwellings with Basements	Moderate; rippable bedrock @1.5-3.5'	Severe; seasonal high water table
Limitations for Dwellings without Basements	Moderate; frost action potential	Severe; frost action potential
Limitations for Lawns and Landscaping	Moderate; frost action potential	Moderate; seasonal high water table
Limitations for Local Roads and Streets	Moderate; frost action potential	Severe; seasonal high water table

Source: SCS, 1976

Penn Series (PnB) - these are moderately deep, well-drained soils ranging from nearly level to strongly sloping occurring on undulating and rolling uplands. The depth to bedrock varies from 1.5 to 3.5 feet and the seasonal high water table is at a depth of greater than 5.0 feet. Depth to bedrock ranges from 1.5 to 3 feet.

Reaville Series (ReB) - these are moderately deep, nearly level to gently sloping, moderately well-drained and somewhat poorly drained soils occurring on upland flats, in depressions, and on concave lower slopes at the heads of drainageways. The depth to the seasonal high water table is at a depth of 0.5 to 3.0 feet late in fall, in winter, and early in spring. Springs and seeps, however, remain wet well into the growing season. Depth to bedrock ranges from 1.5 to 3.5 feet.

C. Ground Water Quantity and Quality

Ground water is all water within the soil and subsurface strata that is not at the surface of the land. It includes water that is within the earth that supplies wells and springs. Ground water resources are often functionally linked to overlying land areas and surface water bodies; ground water is often recharged through "outcrop" areas at the land surface and ground water discharges ("seeps") may contribute to base flows of streams and rivers.

The ground water yields of any particular geological formation are a function of the porosity and permeability of the material comprising the formation (consolidated rock or unconsolidated deposits). Porosity describes the water-containing spaces between individual mineral grains, while permeability is the ease or difficulty with which water is transmitted through interconnecting spaces in the formation. Formations lacking open spaces between the mineral grains have both low porosity and low permeability. Weathering and cracking of the parent bedrock can induce secondary porosity in the formation; water can accumulate and move through these fractures in the primary rock formation.

The project site is underlain by red shale and sandstone associated with the Brunswick Formation, the most important bedrock aquifer in the Triassic Basin (Anderson, 1968; Carswell, 1976). The formation, consisting for a series of tabular beds of varying thickness, extends to depths of approximately 8000 feet. Little water is available from the formation's primary porosity; the voids are too small to allow sufficient permeability for transmitting water to a well. Ground water is mainly stored and transmitted along horizontal bedding planes and nearly vertical joints and fractures, in what is termed secondary porosity.

Reported yields of industrial and public supply wells (wells greater than six inches in diameter) from various areas in the Brunswick Formation range up to 1,000 gallons per minute (gpm), with average yields ranging from 100 to 140 gpm (Anderson, 1968; Carswell, 1976). According to the New Jersey Geologic Survey, recharge rates to the Brunswick Formation range from 350,000 gpd per square mile during a normal year to 225,000 gpd per square mile during a dry year (NJDEP, 1974).

Ground water obtained from the Brunswick Formation is considered to have good natural water quality. The ground water may be hard, with calcium carbonate ($CaCO_3$) concentrations measuring about 150 parts per million (ppm). Deep wells may exhibit greater hardness as a result of longer contact between water and minerals. Water obtained from wells drilled into shale deposits may have high iron concentrations; these elevated levels of iron are primarily an aesthetic problem and can be reduced if necessary. Other contaminants may be introduced from exogenous sources (e.g., septic systems, chemical spills, leaching) through the cracks and fissures in which most of the ground water is stored.

D. Surface Water Quantity and Quality

Surface waters include lakes, rivers, ponds, and streams - water bodies at the surface of the land. These waters serve as valuable habitats for aquatic organisms; collect, store and distribute water from rainfall; and serve as important aesthetic and recreational features.

The Phase I project site along Amwell Road is the headwaters for Royce Brook, which is a tributary of the Millstone River. The waters of Royce Brook flow from the general area of the project site eastward and northward, crossing Route 206 between Amwell and Homestead roads, and entering the Millstone River at the Manville Causeway, approximately seven miles east-northeast of the project site. The Millstone River itself is located within the Raritan Watershed, the largest drainage basin in Somerset County. Royce Brook has a total drainage area of 16.8 square miles within Somerset County.

Both Royce Brook and the Millstone River are classified as FW2-NT waters for their entire respective lengths (NJDEP, 1994). By definition, FW-2 waters are suitable for public potable water supply after required treatment. This classification requires that waters be acceptable for primary contact recreation, industrial and agricultural use, and maintenance and migration of the established biota. The Non-Trout (NT) suffix indicates that the waters do not possess the properties suitable for the maintenance of trout species, i.e., high dissolved oxygen

levels, relatively low summer temperatures, and low pollutant loadings. However, more tolerant fish species, particularly warm-water species, may flourish in such waters.

The United States Geological Survey (USGS) maintains a water quality monitoring station on the Millstone River at Blackwells Mills. The USGS monitors stream discharge rates for Royce Brook, but does not monitor water quality. Water quality data for Water Year 19.. at the Millstone River monitoring station are summarized in Table 2, together with FW2-NT standards. Standards are met for pH, chloride, total dissolved solids, sulfate, and temperature. Values for dissolved oxygen (DO) at the Millstone River station periodically drop to the minimum level of the pertinent standard, although the average DO exceeds the standard. Standards are not met for fecal coliforms or total phosphorus. These exceedances likely due to the extensive acreage of agricultural land in the immediate drainage area.

The Millstone River watershed is dominated by suburban development, with scattered agricultural areas interspersed as less common land use. According to NJDEP characterizations, point source problems apparently originate from several wastewater treatment plants, while non-point sources include both suburban and agricultural areas. Water quality monitoring from 1983 through 1993 has demonstrated fair to good water quality waters in the Millstone watershed, while fish sampling has demonstrated the existence of a moderately degraded warm-water fish community (NJDEP, 1992).

In the vicinity of the project site, the Royce Brook stream channel is narrow and mainly silty; some shaly riffle areas were noted. Invertebrates noted included caddisfly larvae (including Rhyacophylidae, errant caddisflies), Physa and Lymnaea (common pulmonate snails), and tipulid (cranefly) larvae. These presence of these several benthic macroinvertebrate taxa is an indication that water quality is generally good, with influences from agricultural land.

E. Vegetation

Vegetation is the plant life or the total plant cover that is found in a specific area, whether indigenous or introduced by humans. The Piedmont Physiographic Province of New Jersey contains a moderately diverse mixture of major terrestrial plant habitats, including freshwater marshes, bogs, swamps and floodplains, upland valleys and slopes, upland ridges, and rock outcrops (Robichaud and Buell, 1973). This habitat diversity results in a mosaic of plant communities occurring in small areas, a situation rather different from the more homogeneous habitat conditions and plant communities found in southern portions of the state.

Table 2

1993 Water Quality Data for Millstone River at Blackwells Mills

PARAMETER	FW2-NT STANDARDS	MILLSTONE RIVER AT BLACKWELLS MILLS (Mean)	MILLSTONE RIVER AT BLACKWELLS MILLS (Range)
Flow (cfs)	-	509	46-1650
pH (SU)	6.5-8.5	7.4	7.1-7.5
Dissolved Oxygen (mg/l) (minimum)	5.0 (24-hr average)	8.8	5.0-13.6
BOD (mg/l)	-	<2.0	<1.0-5.0
Fecal Coliform (MPN/100 ml)	200 (geom. mean)	**264**	50-1800
Chloride (mg/l)	250	31.8	17-56
Total Phosphorus (mg/l)	0.1	**0.335**	0.08-0.75
Suspended Solids (mg/l)	40	-	-
Total Dissolved Solids (mg/l)	500	146	93-178
Sulfate (mg/l)	250	28.8	18-37
Temperature (°C)	<30	14.0	2.0-25.0
Total Nitrogen (mg/l)	-	3.2	2.0-5.3
Ammonia (mg/l)	0.05	0.042	<0.03-0.07

Source: USGS, 1994

The species composition and structure of vegetative communities within the property reflect a history of long-term disturbance, primarily associated with past agricultural use of the property. As is characteristic of Hillsborough Township, Somerset County, and the Piedmont of New Jersey, the vegetation on the site consists of a mosaic of open field communities interspersed with mature and maturing woodlands. These community features are indicative of the site's past use in agriculture, and of its present state of abandonment.

The Phase I project site is mainly active or fallow agricultural fields, with a small area of wetlands characterized by EcolSciences as palustrine emergent marsh/wet field. The vegetative assemblages of such habitats are as follows:

Active Agricultural Land - this community designation corresponds to active farmland and pasture. The active farmland is planted in corn, soybean, and hay; the pasture is principally for cattle. Common ruderals noted in fields include carpetweed, horsenettle, foxtail grass, velvet leaf, milkweed, onion, and ragweed.

Upland Field - this upland community designation includes various successional stages, ranging from herb-dominated fallow agricultural fields to dense shrub-dominated thickets. Fallow agricultural fields are typically dominated by either little bluestem grass, orchard grass, or foxtail grass. Subordinate species commonly noted include old field cinquefoil, goldenrod, aster, red clover, Canada thistle, Queen Anne's lace, wild strawberry, yarrow, English plantain, and dandelion. Multiflora rose, red cedar, silky dogwood, and raspberry have become established in unplowed fields. In shrub-dominated areas, gray-stem dogwood and red cedar are the most important species, often forming dense thickets. Other commonly-noted woody species include multiflora rose, bayberry, silky dogwood, crab apple, blackhaw, and raspberry. Common herbs in these woody thickets, particularly in less dense areas, include little bluestem grass, wild strawberry, grass-leaved and tall goldenrod, yarrow, and sheep sorrel.

Wet Field - this wetland community designation applies to herb-dominated fallow agricultural fields. Important herbaceous species include soft rush, beggar-ticks, anthraxon grass, and (in one location) common reed. Less common herbs include seedbox, swamp milkweed, aster, woolgrass, New York ironweed, redtop, and grass-leaved goldenrod.

Palustrine Emergent Marsh (PEM) - this wetland community designation applies to wet areas generally found in association with drainageways, and with the SCS-mapped Croton soils. Within the drainageways, sweetflag and rice cutgrass are dominant species, occurring in association with New York ironweed, soft rush, woolgrass, bugleweed, mint, arrow-leaved tearthumb, willow herb, tickseed sunflower, and whitegrass. Within the areas mapped by SCS as Croton soils, cattail is the dominant species, occurring in association with New York ironweed, sensitive fern, arrow-leaved tearthumb, blue vervain, and rough-leaved goldenrod. Common woody species noted within these areas are American elm and red maple saplings, swamp rose, and silky dogwood.

F. Wildlife

The utility of an area as wildlife habitat depends on many factors. All wildlife species require food, water, cover, and space. The relative abundance or lack of these resources in relation to each species' particular requirements will, in part, determine the species composition and distribution of a particular area. In addition, the types of vegetative communities present, the size, shape, and complexity of the habitat(s), and the surrounding land uses will further interact to determine the success of various wildlife species at the location being considered. Some wildlife species have demonstrated great adaptability and tolerance to the human presence; others are less able to tolerate such activities and are displaced to more suitable habitats, if such are available and accessible.

The faunal species represented on the site largely reflect the current and historic agricultural nature of the site, as well as the spatial location of the property in relation to Sourland Mountain. Agricultural utilization of the site has created a patchwork of active farm fields, recently fallowed and herb-dominated fields, abandoned fields now reverting to woodland, and mature or maturing forest. A list of wildlife species identified within the full PAC tract during EcolSciences' 1991 site investigations was presented in the 1991 General Development Plan (Van Cleef Engineering Associates, 1991). Most of the species described in that listing, except for those species generally limited to forested areas, could potentially make use of certain habitats within the Phase I project site.

The New Jersey Natural Heritage Program Data Base, a computerized listing of species-occurrence records maintained by NJDEP, indicates that the bobolink (*Dolichonyx oryzivorus*) may occur within the larger PAC site (Natural Heritage Program, October 9, 1991

correspondence; Appendix A). The documented sighting was at the Mill Lane and Riverside Drive junction, well northwest of the Phase I project site. The bobolink is listed as threatened by the state; this upland bird requires large, open, grassy fields, meadows, pastures, and fields (hay, clover, alfalfa) for breeding and nesting. Although this species was not observed by EcolSciences during its field investigations on the site, habitat suitable for this species does occur within the site.

G. Critical Environmental Features

There are certain features of any tract of land that either have more inherent environmental value, or are more susceptible to perturbation, or both that are generally termed "critical environmental features". Such critical environmental features may be special habitats such as wetlands, wildlife areas, or stand of native vegetation; they may also be features that require special planning and permitting (steep slopes, floodplains, aquifer recharge areas, high water tables or bedrock outcrops).

Hillsborough Township has, in its Land Use Regulations (Section 81-5K(6), identified certain environmental areas that it considers "critical impact areas" to be characterized during site planning. These critical impact areas include Wetlands, Streams and Stream Corridors, Aquifer Recharge/Discharge Areas, Areas of High Water Table, Acidic or Highly Erodible Soils, Steep Slopes, and Shallow Bedrock. The Township maintains large-scale maps of these features; that mapping is based on the underlying SCS mapping of particular soil types. The existing properties of such features are summarized in the following subsections.

1. **Wetlands** - wetlands are lands where water saturation is the dominant factor determining the nature of soil development and the types of plants and animal communities living in the soil and on its surface. Wetlands are transitional areas between terrestrial and aquatic systems, and are unique biological habitats of socioeconomics value. Wetland moderate extremes in water flow, aid in the natural purification of water,and may be areas of groundwater recharge. According to regulations promulgated by the United States Army Corps of Engineers (COE) and the Environmental Protection Agency (EPA) (33 CFR Section 323.2 and 40 CFR Section 230.2, respectively) and pursuant to the New Jersey Freshwater Wetlands Protection Act (1987), wetlands are those areas that are inundated or saturated with surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

EcolSciences, Inc., conducted wetland delineations on the project site and abutting areas of the proposed PAC tract in September and October of 1991. The wetland boundaries were flagged in the field; the locations of the boundary markers were surveyed and transferred to the site plans. EcolSciences is preparing a submittal to NJDEP for a Letter of Interpretation (LOI) that will verify the boundaries of the wetlands on the project site.

According to EcolSciences' wetland delineation, the Phase I project site has one small wetland area in the northeastern section, characterized as palustrine emergent marsh/wet meadow. The vegetative species found in these habitats have been discussed above (Section E).

2. **Critical Wildlife Habitat** - critical wildlife habitats are specific areas known to serve an essential role in maintaining wildlife populations, particularly by serving as preferred habitats for wintering, breeding, or migrating. Rookeries for colonial nesting birds, natural corridors for wildlife movement, and ecotones - the edge areas present at the boundaries between two different habitats - are particularly valuable wildlife areas.

The project site is largely agricultural land; such lands can provide adequate habitat for a variety of invertebrates, upland birds, and small mammals. However, the site does not represent critical wildlife habitat.

3. **Stands of Mature Natural Vegetation** - stands of mature natural vegetation are of significance as habitats of preference for particular species and as educational resources demonstrating the adaptive trends of natural vegetation under specific conditions. As such, these stands of vegetation are important resource for the indigenous flora or fauna, and for the human population that resides in or visits their vicinity.

As noted previously, the project site consists of former agricultural land that has been completely altered in vegetative composition and structure by human activities. Thus, the vegetation on the project site does not represent significant or exemplary stands of mature natural vegetation.

4. **Floodways and Floodplains** - the area inundated by the flood waters of a river or stream is termed the floodplain. Within the floodplain can be found several subdivisions: the channel, where normal, non-floodplain flow is confined; the floodway, or terrestrial areas on the margins of the channel that show permanent terracing effects or repeated flooding; and the

flood fringe, or areas landward of the floodway that may be inundated during more severe (and less frequent) storms. Taken together, these areas constitute the flood hazard area around a river or stream.

According to the Hillsborough Township's Natural Resources Inventory Map Number 2 (Flood Plain Soils), areas in the general vicinity of the project site that are mapped as floodway, subject to flooding several times annually, correspond to the Rowland soils as mapped by the SCS. There are no Rowland soils mapped on the Phase I project site.

The floodways and 100-year floodplains have been mapped along the South Branch Raritan River and its tributaries by the Federal Emergency Management Agency (FEME, 1981). According to this mapping, the project site is located in Zone C, above the 100- and 500-year floodplain boundaries.

5. **Aquifer Recharge Areas** - generally, aquifer recharge areas occur where highly permeable soils overlie water-bearing formations. In these areas, groundwater is readily replenished through infiltration of precipitation through upper soil layers. The potential of a specific area for recharge is dependent upon surficial soils and underlying formations. High potential aquifer recharge areas are defined by the Soil Conservation Service as having a slope between 0 and 8 percent and a permeability of greater than 6 inches per hour; moderate potential aquifer recharge soils are defined as having a slope between 0 and 8 percent and permeability of between 2 and 6 inches per hour. Soils with steeper slopes or lesser permeability would offer limited recharge potential. In addition to soils with high and moderate recharge potential, fractures and solution channels can provide areas of groundwater recharge to deeper, bedrock formations.

The Penn and Reaville soils mapped across the project site have slopes of 2-6 percent, and have permeabilities of 0.6-2.0 inches per hour. By the criteria outlined above, these soil attributes would confer moderate recharge potential to the on-site soils.

6. **Areas of High Water Table** - the water table of a soil or geological formation is defined as the upper surface of ground water, i.e., that level below which the soil is seasonally saturated with water (not including short periods of time following rains or thaws) (Tarbuck and Lutgens, 1987). The water table level is an important soil characteristic, having a primary influence on the flows of springs and streams, the productivity of wells, the water levels of

ponds and lakes, and the establishment of hydrophytes in wetland areas. The depth to the water table is also an important consideration in the design of facilities for a site, affecting the degree to which excavation can be practiced for foundations, basements, septic systems, and other topographic modifications.

The Penn soils on the project site have a nominal seasonal high water table at a depth of greater than 5 feet, while the Reaville soils have a nominal seasonal high water table at a depth of 0.5 to 3.0 feet.

7. **Bedrock Outcrops** - bedrock formations are generally found beneath well-developed soil layers. However, there are areas where, because soils have been eroded or scraped away by glacial activity or because bedrock strata have been uplifted by tectonic processes, bedrock is exposed as "outcrop" areas. Such areas may serve as important ground water recharge or discharge areas; these areas also present special constraints to site development.

Nominal depth to bedrock for both the Penn and Reaville soils on the project site is 0.5-3.5 feet. The upper layers of bedrock of the Brunswick Formation are characterized as "rippable," meaning that this weathered upper layer can be excavated with conventional construction equipment.

8. **Steep Slopes** - the slope of the ground surface is calculated as the relationship of rise (vertical change) to run (horizontal change), often expressed as a percentage. Gentle slopes encourage the formation of deep soils that often have low erosion hazardous; steeper slopes tend to have shallower soils with more potential for erosion.

Both the Penn and Reaville soils on the project site have gentle slopes of 2-6 percent.

9. **Hydric, Acidic, or Highly Erodible Soils** - hydric soils are those soils that contain sufficient water to develop anaerobic conditions over substantial periods of the year. Such soils promote the success of wetland vegetation. Acidic soils are soils rich in sulfide minerals; when such soils are exposed to air, oxidation of the sulfides may lower the pH of water percolating through these soils. Highly erodible soils are those that, because of their location and/or physical properties, tend to be displaced (eroded) by water flowing across the soil surface.

Neither the Penn nor the Reaville soils are classified as hydric soils by the National Technical Committee for Hydric Soils (10/87), or as New Jersey Hydric Soils (Tiner, 1985). Likewise, neither soil has a pH that would cause it to produce acidic leachate upon exposure and weathering. Both the Penn and Reaville soils have a slight erosion hazard, according to SCS (1976).

H. Air Quality

The Federal and State environmental regulatory agencies have established permissible concentrations, termed air quality standards, for common airborne pollutants such as carbon monoxide, hydrocarbons, nitrogen oxides, photochemical oxidants, and lead. These standards have been shown to reduce to an acceptable level the risk of health effects to vulnerable human populations, primarily the young, the elderly,and those with respiratory ailments. Primary standards define air quality levels intended to protect the public health with an adequate margin of safety. The secondary standards define levels of air quality intended to protect the public welfare from any known or anticipated adverse effects of a pollutant.

The Township of Hillsborough is situated within the New Jersey/New York/Connecticut Air Quality Control Region. The USEPA has classified this area as Priority 1, meaning that violations of established standards for each criterion pollutant have been recorded at monitoring sites within the region. New Jersey as a whole is in violation of the ozone standard.

The Township of Hillsborough is situated within NJDEP's "Suburban" reporting region. This region has air quality monitoring stations at Chester (SO_2, O_3, and NO_2), Morristown (CO), New Brunswick (O_3), Plainfield (O_3, NO_2), and Rutgers University (O_3, NO_2). There were no violations of the CO primary or secondary standards at the Morristown location in 1994, nor were there violations of the NO_2 standard at Chester, Plainfield, or Rutgers, or violations of the SO_2 standards at Chester. In 1994, the Chester, New Brunswick, Plainfield, and Rutgers locations experienced 0, 4, 2, and 0 days, respectively, when ozone levels exceeded the primary standard, and 123, 149, 85, and 0 hours, respectively, when ozone levels exceeded the secondary standard.

The overall trend in New Jersey is toward fewer violations of air quality standards. For example, the Morristown location was out of compliance (i.e., exceeded) the 8-hour carbon monoxide standard on 267 days in 1975, 25 days in 1980, 2 days in 1985, and zero days in 1990 (NJDEP, 1995). Since 1975, the number of days out of compliance has declined by an order

of magnitude per five-year interval. Apart from ozone concentrations, which vary widely with prevailing warm-weather conditions, other air contaminants in New Jersey have shown similar declines.

I. Sound Characteristics and Levels

Sound is conducted through air as a series of pressure waves having kinetic energy. The kinetic energy of these sound waves can be quantified in decibels - scalar units that are geometrically related to the energy of the sound at the receptor. A doubling in the sound energy will yield an increase of 6 dB. The decibel (dBA) scale ranges from 0 for the threshold of perception of sound to approximately 130 dBA for the threshold of pain at the ear; a quiet residential street may have noises in the 55-60 dBA range, while heavy street traffic generates noises in the 85-95 dBA range (EPA, 1976). The "A" suffix means that the sound energy characteristics have been weighted to emphasize the upper audible frequency ranges (A-weighting).

The project site is within a low-density rural area, and ambient sound levels are likely to be in the range of 40-52 dBA (EPA, 1976).

J. Demography

The demographic characteristics of a municipality define the characteristics of the human population living in this municipality - the population size, rate and direction of change in size, age structure, etc. These characteristics provide a perspective for assessing the degree to which a proposed development will affect the municipality.

The Township of Hillsborough had a 1990 censused population of 28,808 individuals, an increase of 9,747 individuals over the 1980 censused population of 19,061. This translated into an annual growth rate of 4.22 percent over that decade. Somerset County as a demographic unit had an annual growth rate of 1.69 percent over the same period.

K. Land Use

The development of a site is in many cases a major alteration of the features of a property. The extent to which such change in land use is significant depends in part on the existing land use(s) on the site and in surrounding areas, and on the zoning constraints selected for the land by the governing municipality.

The Phase I project site, as well as the larger PAC site of which the project site is a part, is situated within an area designated as an agricultural zone, with residential development along Amwell Road and Mill Lane. As noted in Chapter II, the Hillsborough Code indicates that a "PAC or PAC/HCF shall be a permitted use in the RA, AG, RS, R, R1, CR, AH, TC, and PD Residential Zone Districts." (§77-91.1D(1)).

L. Aesthetics

The aesthetic quality of a particular area is a general representation of how the area is perceived by humans. Literally, it is how the sensory information provided by an area is interpreted. Pleasing visual, auditory, and olfactory stimuli will combine to provide a perception of high aesthetic appeal. Offensive sights, sounds or odors will yield the opposite impression. Aesthetics, of course, vary from observer to observer; generally though, rural and natural landscapes offer higher aesthetic appeal than do urban, highly modified landscapes.

The Phase I project site is located in a relatively rural setting of agricultural lands and farmhouses separated by single-family residences. The site is in the general area of two historic districts that retain the character of 19th century villages. The project site's rural setting, rolling fields, farmland, and proximity to the Sourlands generates a positive, pleasing aesthetic appeal.

M. Cultural Resources

Cultural resources are man-made or man-modified features of the environment, including objects, structures, site and districts deemed to be of cultural significance. Such resources may be pre-historic or historic in age, and are often worthy of preservation to provide present and future generations with a sense of the peoples who once lived and worked in a particular locality.

Requests were made by EcolSciences to the Office of New Jersey Heritage and to the New Jersey State Museum requesting information on historical and archaeological resources on or near the full PAC tract. Replies from those agencies (New Jersey State Museum, October 23, 1991 correspondence; New Jersey Natural Heritage Program, October 9, 1991 correspondence) (Appendix A) have indicated that there were no known historical resources on the site. The Office of New Jersey Heritage Letter noted the location of the Neshanic and Neshanic Mills Historic Districts adjacent to the site.

Examination of cultural resource listings maintained by Somerset County and by Hillsborough Township show that there are five inventoried structures within the full PAC tract. These are 1) the Bergen Huff House (Dutch Vernacular) northwest of Phase I project site near River Road, 2) the Old Craig House (Dutch Vernacular) along Mill Lane, 3) a Vernacular/Victorian farmhouse near Amwell Road, 4) another Dutch Vernacular house along Mill Lane, and 5) a Pratt through-truss bridge north of the project site at the railway embankment forming the PAC site's northern boundary. None of these structures are located within the Phase I project site. A complete listing of the cultural resources in the vicinity of the full PAC tract was presented in the 1991 General Development Plan.

N. Socioeconomics

The Hillsborough Township Master Plan, adopted June, 1990, recognized the need to provide affordable housing for senior citizens, who constitute an increasing proportion of the Township's population (a 76% increase in individuals aged 60 or older between the 1980 and 1990 censuses). The Township's Master Plan recognizes the Mill Lane area as one location where the goal of providing senior citizen housing opportunities can be implemented.

O. Traffic

The existing and projected future traffic patterns and volumes have been evaluated in detail in a report prepared by McDonough & Rea of Manalapan, New Jersey. Please refer to that report for details.

IV. ASSESSMENT OF ENVIRONMENTAL IMPACT

This chapter addresses the potential impacts to the environmental resources of the project site and surrounding areas that could result from the proposed development. Potential impacts are first discussed generally, then according to the specific topics set forth in the preceding chapter that inventoried environmental characteristics of the site. The incorporation of mitigation measures during construction and operational phases of the proposed project are cited here in the context of the potential impacts; reference is made again to these mitigating measures in the following chapter.

In general, the principal environmental impacts associated with the construction phase of such a small residential subdivision result from temporary disturbances to soils and vegetation. In the absence of appropriate control measures, clearing of vegetated tracts of land for construction and access to construction sites could reduce the productivity of the soil and create unsightly conditions and fugitive dust. Precipitation falling on disturbed areas could tend to erode fine soil particles and, in the absence of appropriate controls, increase loadings to areas receiving stormwater runoff. As will be detailed below, these potential adverse effects will be minimized by adherence to the Soil Erosion and Sediment Control Plan, as approved by the local district of the Soil Conservation Service.

The principal environmental impact associated with the operational phase of the proposed small residential subdivision would be the change in land use and the direct and indirect influences on the surrounding communities associated with the use of the site as a residential subdivision for single-family residences. Construction of the development will convert approximately 9.8 acres of agricultural land to residential use; this is a long-term effect that is anticipated by the Township's designation of PAC as a permitted use in the AG zone in which the project site is located.

Potential impacts on specific natural or human resources are discussed in the following sections.

A. Geology and Topography

Potential impacts to the project site's geological integrity are related to the location and extent of bedrock disturbance resulting from the construction phase. The SCS' description of the major soil types on the site (Penns and Reavilles) indicate that the depths to bedrock in these

soils are relatively shallow, ranging from one and one-half to three and one-half feet (SCS, 1976). However, the underlying shallow bedrock - the upper stratum of the Brunswick formation - is "rippable", and can be excavated using standard excavation equipment and techniques. Thus, no significant impacts to the project area's geological integrity are anticipated from the construction of the proposed development.

B. Soils

In the absence of appropriate control measures, construction activities may result in both short-and long-term impacts related to soil loss. Removal of topsoil and organic layers could reduce the productivity of the soils, remove ground cover vegetation, and create unsightly conditions. However, soil loss and associated adverse impacts will be minimized by strict adherence to the measures specified in the Soil Erosion and Sediment Control Plans, as approved by the local district of the Soil Conservation Service.

These soil erosion measures include the use of crushed stone cleaning blankets at construction roadway intersections with paved roads, installation of inlet sediment traps for all catch basins, installation of construction/filter fences along all wetland transition areas, and phased construction to limit areas of disturbance. Immediately following rough grading, all disturbed soils will be protected from erosion and soil loss by temporary seeding and mulching. Permanent vegetation will be established as soon as possible after final grading, as specified in the site plans. The use of retaining walls will also limit disturbance along wetland transition areas. In areas where grading is necessary, rapid stabilization of all disturbed soil areas will minimize adverse effects related to soil loss or erosion.

For a complete description of the soil erosion and sediment control measures, please refer to the plans prepared by Van Cleef Engineering Associates.

No long term effects on the soils of the site are anticipated. The rapid stabilization of soils with vegetative cover, and the replacement of existing vegetation with landscaped areas, will minimize long-term soil losses from the site.

C. Ground Water

Recharge to ground water reservoirs comes from precipitation percolating through overlying soil and rock strata; thus, the quality of ground water is in part a function of the land use in recharge areas of ground water aquifers. Many communities of northern New Jersey rely

heavily on groundwater aquifers for domestic water supplies, and the perpetuation of good water quality in those aquifers is an environmental concern of high priority.

Construction of the proposed 25-unit residential development is not expected to have an adverse impact on the ground water resources of the project area. No ground water withdrawal or wastewater disposal is proposed within the site. Potable water for the proposed development will be provided by the Elizabethtown Water Company. The daily water demand from the development will be approximately 3,275 gpd (Van Cleef Engineering Associates, 1996).

Since no ground water wells will be required to service the development, the existing ground water reserves that may underlay the project site will not be adversely affected by the proposed construction. However, there will be a slight increase in impervious surfaces as a result of the proposed development; therefore, the potential recharge to ground water reserves will be decreased within the site. The soils within the proposed development, however, are of moderate recharge value, and the slight shift from infiltration to runoff should have only a nominal impact on ground water resources.

No on-site disposal of wastewater is proposed. Wastewater generated by the development, estimated to be 3,275 gpd, will be exclusively domestic and will be conveyed to the Somerset-Raritan Valley Sewerage Authority Sewage Treatment Plant for treatment and disposal. This off-site treatment and disposal of wastewater by a regional municipal facility will eliminate the potential for contamination of ground water by wastewater effluent.

D. Surface Water

The construction of the proposed subdivision is expected to have an insignificant impact on the surface water resources in the vicinity of the project area. Potential short-term impacts to surface water quality are generally associated with soil loss, erosion, and sedimentation during construction activities. As previously described in Section B (Soils) of this chapter, soil disturbance will be largely confined to areas surrounding the proposed residential buildings and roadway construction. Any adverse impacts will be minimized by the installation and maintenance of proven soil erosion and sediment control measures presented in the plans. These measures will retain disturbed soil sediment within the areas of construction, and will mitigate the potential for sediment being transported to Royce Brook and, ultimately, to the Millstone River.

Following development, stormwater runoff from developed areas of the Phase I project site will be conveyed to a large detention basin to the east of the main access road. This detention will assure that net peak post-development runoff rates to Royce Brook will not exceed existing peak runoff rates for all stormwater events up to and including the 100-year storm event. Detention will also promote the sedimentation of particulate materials and the several classes of chemical compounds (e.g., hydrocarbons, pesticides, heavy metals) that adsorb strongly to fine soil particles. Such stormwater detention meets NJDEP requirements for treatment prior to discharge to State open waters.

E. Vegetation

The construction of the proposed development will result in the removal of most of the existing vegetation on the Phase I project site (except for the wetland area and associated buffer). This vegetation is primarily successional/old field vegetation. A landscaping plan for the project will be implemented to mitigate for the loss of natural vegetation and to enhance the aesthetic features of the development. The plan provides for the establishment of an aesthetically-pleasing arrangement of pin oaks, red maples, Newport ash, littleleaf lindens, Norway spruce, and "Green Vase" zelkova along the interior roadways of the subdivision. Additionally, the new residents will have supplemental plantings of ornamental shrubs, ground cover, and lawns.

F. Wildlife

Noise, heavy equipment, and human activity during the construction phase of the project will cause most mobile wildlife species to move from the property into adjacent undeveloped areas. Impacts to wildlife are expected to be minimal because the proposed development will occupy only a small proportion of a large tract of land containing similar habitats. The developed site will continue to offer habitat for wildlife species tolerant of human activities; such species include many species of songbirds, deer and some species of small mammals. Additionally, the wetland habitats on the site will suffer minimal disturbance and retain a natural vegetated upland buffer to further protect this community and its inhabitants.

G. Critical Environmental Features

1. **Wetlands** - according to EcolSciences' wetland delineation, the Phase I project site has one small wetland area in the northeastern section, characterized as palustrine emergent marsh/wet meadow. The wetland will be contained within an open space lot of the residential development. Construction of the access roadway will require reduction of the wetland transition area along its northern boundary, with a concomitant increase in transition area on the

southern side, according to a Transition Area Averaging Plan that requires NJDEP approval. Additionally, a General Permit #11 will likely be needed to install the discharge from the stormwater detention basin in the Royce Brook stream corridor.

2. **Critical Wildlife Habitat**

The Phase I project site is mainly active or fallow agricultural fields that provide adequate, but not critical habitat for a variety of upland birds and small mammals.

3. **Stands of Mature Natural Vegetation**

The project site is mainly active or fallow agricultural fields similar to many other areas in central New Jersey and, as such, does not represent significant or exemplary stands of mature natural vegetation.

4. **Floodways and Floodplains**

The Phase I project site is not located within any mapped floodway or floodplain.

5. **Aquifer Recharge Areas**

The soils on the project site would be anticipated to have moderate recharge capabilities; as such, the project site does not represent an area of unusually high aquifer recharge.

6. **Areas of High Water Table**

The Penn soils on the project site have a nominal seasonal high water table at a depth of greater than 5 feet, while the Reaville soils have a nominal seasonal high water table at a depth of 0.5 to 3.0 feet. It is possible that ground water seepage could be encountered during excavation for building foundations or subsurface utilities; such seepage can be handled with conventional construction techniques.

7. **Bedrock Outcrops**

The SCS' description of the major soil types on the site (Penns and Reavilles) indicate that the depths to bedrock in these soils are relatively shallow, ranging from one and one-half to three and one-half feet (SCS, 1976). However, the underlying shallow bedrock - the upper stratum of the Brunswick formation - is "rippable", and can be excavated using standard excavation equipment and techniques. Thus, no significant impacts to the project area's geological integrity are anticipated from the construction of the proposed development.

8. **Steep Slopes**

Both the Penn and Reaville soils on the project site have gentle slopes of 2-6 percent.

9. **Hydric, Acidic, or Erodible Soils**

Neither the Penn nor the Reaville soils are classified as hydric soils by the National Technical Committee for Hydric Soils (10/87), or as New Jersey Hydric Soils (Tiner, 1985). Likewise, neither soil has a pH that would cause it to produce acidic leachate upon exposure and weathering. Both the Penn and Reaville soils have a slight erosion hazard, according to SCS (1976).

H. Air Quality

Short-term air quality impacts during construction are related to production of fugitive dust and generation of emissions from exhausts of construction vehicles. Mitigating measures, including dust control practices and the use on construction equipment of efficient air pollution control devices meeting applicable State/Federal specifications, will minimize adverse effects on local air quality.

Long-term air quality impacts will be related primarily to automobile exhaust emissions, primarily carbon monoxide (CO), hydrocarbons, and nitrogen oxides (NO_x). The magnitude of such air quality impacts is a function of several variables, including the anticipated increases in local traffic related to operation of the residential subdivision, the volume of traffic that would use area roadways independently of the subdivision, and the anticipated changes in emissions due to emission control technology and replacement of older vehicles with newer ones.

The increases in air loadings anticipated from the operation of 25 additional residences, and the vehicles of the residents, will be nominal, and will have no perceptible impact on regional air quality.

I. Sound Characteristics and Levels

Short-term generation of noise levels elevated over existing ambient levels will be generated during the construction of the proposed development. Sound levels generated during the construction phase can be expected in the range of 66 to 78 dBA at a distance of 50 feet from construction equipment, based upon the use of best available technology for noise reduction (USEPA, 1976). The construction equipment included in this range consists of backhoes, concrete mixers, concrete vibrators, mobile cranes, dozers, pavers, and trucks. To minimize

adverse impacts to ambient noise levels during the construction period, construction equipment will only be operated during normal daylight hours.

Conversion of the site from agricultural fields to residential development will increase ambient noise levels moderately. However, towards the interior sections of the property, post-development ambient noise levels are expected to be similar to those associated with quiet suburban residential areas - in the 48-52 dBA range (USEPA, 1976).

J. Demography

The 25 residences to be constructed in the Phase I action will be generally occupied by permanent residents that are 55 years or older in age. As such, the proposed residential subdivision would add on the order of 44 individuals to the Township's population, with few or no school-age children in that increase.

K. Land Use

The Phase I project site lies within a larger tract for which a Planned Adult Community is being proposed. The PAC option is a permitted use within the Agricultural zone, and conforms in purpose and location with recommendations of the Township's Master Plan.

L. Aesthetics

The proposed residential subdivision will convert approximately 9.8 acres of agricultural land to residential development. Although this may be viewed as a diminution of the site's aesthetic value, this impact will be mitigated through landscaping with native and ornamental plantings.

M. Cultural Resources

No documented cultural resources will be impacted by the proposed subdivision.

N. Socioeconomics

The proposed action satisfies a significant need within Hillsborough Township and Somerset County, and is consistent with the Township's master planning.

O. Traffic

A detailed traffic analysis of the impacts of the proposed residential subdivision has been conducted by McDonough & Rea. Please refer to that report for details.

V. UNAVOIDABLE IMPACTS

The applicant, its engineers, and its consultants have proposed and planned a residential subdivision that will be an integral component of a larger Planned Adult Community, that will meet a documented and growing need, that will be compatible with its surroundings, and that will provide a positive influence in the Township. As discussed in the preceding chapter, most potential impacts have been minimized by sound design decisions in the planning stages of the project. Moreover, compliance with State permit and Township ordinance conditions for regulated activities will protect wetlands, wetland transition areas, and surface water bodies.

The significant environmental impacts resulting from construction and operation of the residential subdivision as configured are anticipated to be the irreversible and irretrievable commitment of natural resources resulting from the change in land use; construction of the project will convert most of the upland portions of the Phase I project site from agricultural land to developed lots and access roadways. This is a commitment of natural resources made by the Township of Hillsborough in their recognition of the area around Mill Lane as suitable for a Planned Adult Community.

Construction of the proposed development will result in minimal changes to existing topography and stormwater quality, and a loss of some areas of upland, open-field wildlife habitat. The mitigating measures described in the preceding chapters will serve to minimize the potential impacts to natural resources in the project area.

The addition of 25 residential units to the Township will have only nominal impacts on air quality, demography, traffic, and infrastructural services.

VI. STEPS TO MINIMIZE ENVIRONMENTAL IMPACTS

A number of potential impacts associated with construction and operation of the proposed project were identified in Chapter IV. Environmental protective measures that can minimize or eliminate environmental impacts are summarized below. Some have already been included in the project plans; others will be implemented during the construction phases. Many of the measures identified below have already been discussed in the preceding chapter, in the context of the particular environmental features in which they are identified.

A. Soils and Surface Water Resources

- Existing topography will be maintained to the greatest extent possible in the site planning to minimize the amount of grading required.

- A crushed stone tracking pad will be installed at the site exit to reduce tracking of sediment onto adjacent roadways during construction activities.

- Sediment filter fences will be erected around and/or downslope of disturbed areas to prevent sediment from being transported into the on-site wetland areas.

- Upon completion of final grading, all disturbed areas will receive a final seeding and mulching in accordance with the Soil Erosion and Sediment Control Plan.

- All sideslopes shall be protected from erosion by topsoiling, seeding, and mulching as soon as possible after final grading.

- All soil erosion and sediment control measures shall be kept in place until construction is complete and/or the disturbed area is stabilized.

- All work will be done in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey.

- The detention basin will be maintained free of debris and sediment that would interfere with the effective operation of this facility.

B. Air Quality

- Construction vehicles that are to operate upon the public highways of the State of New Jersey will comply with the regulations as required by N.J.A.C. 7:27-14 and 15.

- Disposal of incinerable wastes by open burning will not be permitted.

- Exhaust systems and emission control devices on all construction machinery will be maintained in good operating condition.

- Vehicles transporting fill, dirt, or other materials will be covered with canvas or similar material.

C. Sound Levels

- To minimize noise generated by construction equipment, mufflers or similar noise abatement devices will be in good operating condition on all construction machinery.

- Silencers, shields, or enclosures will be used around all stationary noise-generating equipment.

- Operation of machinery will be limited to daylight hours.

VII. ALTERNATIVES

The proposed subdivision plan has been designed be an integral component of a larger Planned Adult Community in a location in the Township that was specifically identified in the Township's Master Plan as being suitable for such a community. The residential housing for individuals 55 years or older meets a documented and growing need in the Township and Somerset County.

The 25-unit residential subdivision represents Phase I of a Planned Adult Community/Health Care Facility (PAC/HCF) that is anticipated to be constructed on a property totalling approximately 760 acres and consisting principally of active, fallow, and successional fields, divided by small patches of forest that remain in areas not suitable for cultivation. The General Development Plan (last amended September, 1995) for the full project has been approved by the Hillsborough Township Planning Board, and is shown as Sheet 3 of the Phase I plans submitted by Van Cleef Engineering Associates. The Phase I residential subdivision is situated in the south central portion of the larger property.

VIII. LIST OF LICENSES, PERMITS AND OTHER APPROVALS

The following constitutes a list of major licenses, permits and approvals required for the proposed Phase I residential subdivision:

AGENCY	LICENSE, PERMIT OR APPROVAL	STATUS
Hillsborough Township Planning Board	Preliminary/Final Subdivision Approval	Subject of this submission
Somerset County Planning Board	Preliminary Site Plan Approval	To be submitted concurrent with this application
Somerset-Union Soil Conservation District	Soil Erosion and Sediment Control Plan	To be submitted concurrent with this application
Delaware and Raritan Canal Commission	Certification	To be submitted concurrent with this application
New Jersey Department of Environmental Protection (NJDEP)	Letter of Interpretation (LOI) Transition Area Averaging Plan GP#11 - Stormwater facilities	Application to be submitted Application to be submitted Application to be submitted

IX. REFERENCES

Cowardin, L.M.. 1979. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31.

EcolSciences, Inc. 1991. Wetlands Investigation Report for Planned Adult Community, Township of Hillsborough, Somerset County, New Jersey. Draft. November 19, 1991.

Doyle, R. 1991. Personal communication regarding archaeological resources in site vicinity.

Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1988. The Birder's Handbook - A Field Guide to the Natural History of North American Birds. Simon and Schuster Publishing, New York, NY. 785 pp.

Federal Emergency Management Agency (FEMA). 1981. Flood Insurance Rate Map. Community Panel Numbers 340436 0015B and 340436 0025B.

Federal Interagency Committee for Wetland Delineation. 1989. Federal Manual for Identifying and Delineating Jurisdictional Wetlands. U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and U.S.D.A. Soil Conservation Service, Washington, D.C. Cooperative technical publication. 76 pp. plus appendices.

Hillsborough Township. 1976. Natural Resources Inventory Maps.

Hillsborough Township. 1989. Land Use Regulations.

Hillsborough Township. 1990. Zoning Map.

Hillsborough Township Clerk. 1991. 1990 Census data for Hillsborough Township.

Hillsborough Historic Commission. 1978. Aspects of its History.

Killam Associates. 1991. Environmental Assessment: Proposed Raritan River Weir.

Leck, C.F. 1975. The Birds of New Jersey. Rutgers University Press, New Brunswick, NJ. 190 pp.

Leck, C.F. 1984. The Status and Distribution of New Jersey's Birds. Rutgers University Press, New Brunswick, NJ. 214 pp.

New Jersey Audubon Society (NJAS). 1991. Review of New Jersey Birds XVII(1): 1-19.

New Jersey Department of Environmental Protection (NJDEP). 1974. Land-Oriented References Data System, New Jersey Geological Survey Bulletin 74.

NJDEP. 1974. Topographic Series Map No. 25 with Geologic Overlay.

NJDEP, 1980. Endangered and Threatened Species of New Jersey, Trenton, New Jersey. 44 pp.

NJDEP. 1988. Freshwater Wetlands Protection Act Rules, N.J.A.C. 7:7A. Division of Coastal Resources, Trenton, New Jersey.

NJDEP. 1989. New Jersey and National Registers of Historic Places.

NJDEP. 1989. New Jersey Wildlife Profiles. Volume I. Division of Fish, Game, and Wildlife, Trenton, NJ.

NJDEP. 1995. 1994 Air Quality in New Jersey.

NJDEP. 1993. New Jersey 1992 State Water Quality Inventory Report. Division of Water Resources, Trenton, New Jersey.

NJDEP. 1994. Surface Water Quality Standards.

NJDEP. 1991. Letter to EcolSciences, Inc. dated October 15, 1991 referencing historic/prehistoric resources in the project vicinity.

New Jersey Natural Heritage Program. 1991. Letter to EcolSciences, Inc. dated October 9, 1991 referencing records of rare species on the Hillsborough Township parcel, Somerset County, New Jersey.

New Jersey Institute of Technology. 1980. Raritan Confluence Reservoir - Environmental Impacts, Mitigations and Conclusions.

New Jersey State Museum. 1991. Letter to EcolSciences, Inc. dated October 23, 1991 referencing archaeological resources within project vicinity.

New Jersey State Soil Conservation Committee. 1987. Standards for Soil Erosion and Sediment Control in New Jersey.

Queal & Lynch, Inc. 1990. Revised 1980 Master Plan, Township of Hillsborough, Somerset County, New Jersey.

Research & Archaeological Management, Inc. 1989. Cultural Resource Survey, Phase II, New Jersey Historic Sites Inventory for Somerset County, New Jersey.

Robichaud, B. and M. F. Buell. 1983. Vegetation of New Jersey. Rutgers University Press, New Brunswick, New Jersey.

Salisbury, R. D. 1989. The Physical Geography of New Jersey.

Somerset County Planning Board. 1983. Natural Resource Inventory.

Somerset County Planning Board. 1987. Somerset County Master Plan.

South Branch Watershed Association. 1975. A Regional Natural Resource Inventory for East Amwell, Franklin, Hillsborough, Raritan and Tewksbury Townships.

State of New Jersey Department of Conservation and Economic Development. 1968. Special Report No. 28 - Ground Water Resources of Essex County, New Jersey.

State of New Jersey Department of Conservation and Economic Development. 1968. Special Report No. 27 - Geology and Ground Water Resources of the Rahway Area, New Jersey.

Suthers, H.B. 1987. Old Field Succession and Bird Life in the Sourlands. Records of New Jersey Birds XIII(4): 54-71.

Tarbuck, E. J. and F. K. Lutgens. 1987. The Earth: An Introduction to Physical Geology. Merrill Publishing Company. Columbus, Ohio. 591 pp.

Tiner, R. W., Jr. 1985. Hydric Soils: Their Use in Wetland Identification and Boundary Delineation. In: Proc. Nat. Wetland Assessment Symposium. J. A. Kusler and P. Riexinger (ed). Assoc. State Wetland Managers. Technical Report 1.

United States Environmental Protection Agency (USEPA). 1976. Direct Environmental Factors at Municipal Wastewater Treatment Works. EPA-430/9-76 003. Office of Water Program Operations, Washington, D.C.

USEPA. 1971. Report to the President and Congress on Noise.

United States Fish and Wildlife Service (USFWS). 1975. National Wetlands Inventory Map - Raritan, New Jersey Quadrangle.

USFWS. 1975. National Wetlands Inventory Map - Rocky Hill, New Jersey Quadrangle.

United States Geological Survey (USGS). 1970. Rocky Hill, New Jersey Quadrangle.

USGS. 1981. Raritan, New Jersey Quadrangle.

USGS. 1994. Water Resources Data - New Jersey, Water Year 1993. Volume 1. Surface-Water Data, U.S. Geological Survey Water Data Report NJ-94-1.

United States Soil Conservation Service (SCS). 1976. Soil Survey of Somerset County, NJ.

Widmer, K. 1964. The Geology and Geography of New Jersey. The New Jersey Historical Series, D. Van Nostrand Company, Inc., 193 pp.

ATTACHMENT A

PERTINENT CORRESPONDENCE

State of New Jersey
Department of Environmental Protection and Energy
Division of Parks and Forestry
Office of Natural Lands Management
CN 404 Trenton New Jersey 08625-0404
(609) 984-1339
FAX (609) 984-1427

Scott A. Weiner
Commissioner

October 9, 1991

Lisa A. Sullivan
EcolSciences, Inc.
75 Fleetwood Drive, Suite 250
Rockaway, NJ 07866

Re: Site #30-1545

Dear Ms. Sullivan:

Thank you for your data request regarding rare species information for the above referenced project site in Hillsborough Twp., Somerset County.

The Natural Heritage Data Base has a record for a bobolink occurrence which may be on the project site. The attached list provides additional information about this occurrence. Also attached is a list of rare species from records in the general vicinity of the project site (within approx. 3 mi. for animals, 1.5 mi. for plants and communities). Additionally, enclosed is a list of rare vertebrates of Somerset County together with a description of their habitats. If suitable habitat is present at the project site, these species would have potential to be present. If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend you contact the Division of Fish, Game and Wildlife Endangered and Nongame Species Program.

PLEASE SEE THE ATTACHED 'CAUTIONS AND RESTRICTIONS ON NHP DATA'.

Thank you for consulting the Natural Heritage Program. We have received your check for $30.00 which covers the cost of processing this data request. Please feel free to contact us again regarding any future data requests.

Sincerely,

Thomas F. Breden
Coordinator/Ecologist
Natural Heritage Program

cc: JoAnn Frier-Murza
Thomas Hampton

24 SEP 1991

ON OR IN THE IMMEDIATE VICINITY OF PROJECT SITE
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK	DATE OBSERVED	IDENT.	LOCATION
*** Vertebrates									
DOLICHONYX ORYZIVORUS	BOBOLINK		T/T		G5	S2	1985-SUMMR	Y	MILL LANE/RIVERSIDE DRIVE, HILLSBOROUGH TWP. AT JCT. BETWEEN THE TWO ROADS.

1 Records Processed

GENERAL VICINITY OF PROJECT SITE
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK	DATE OBSERVED	IDENT.
*** Vertebrates								
AMMODRAMUS SAVANNARUM	GRASSHOPPER SPARROW		T/T		G4	S2	1990-07-04	Y
BARTRAMIA LONGICAUDA	UPLAND SANDPIPER		E		G5	S1	1987-06-20	Y
BARTRAMIA LONGICAUDA	UPLAND SANDPIPER		E		G5	S1	1950-??-??	Y
BARTRAMIA LONGICAUDA	UPLAND SANDPIPER		E		G5	S1	1950-??-??	Y
CLEMMYS INSCULPTA	WOOD TURTLE		T		G5	S3	1986-SPRNG	Y
DOLICHONYX ORYZIVORUS	BOBOLINK		T/T		G5	S2	1990-SUMMER	Y
PASSERCULUS SANDWICHENSIS	SAVANNAH SPARROW		T/T		G5	S2	1990-07-20	Y
PASSERCULUS SANDWICHENSIS	SAVANNAH SPARROW		T/T		G5	S2	1965-??-??	Y
POOECETES GRAMINEUS	VESPER SPARROW		E		G5	S2	1981-??-??	Y
POOECETES GRAMINEUS	VESPER SPARROW		E		G5	S2	1980-??-??	Y

10 Records Processed

State of New Jersey
Department of Environmental Protection and Energy
Natural and Historic Resources
Division of Parks and Forestry
Office of New Jersey Heritage
CN 404
Trenton, NJ 08625-0404
Tel. # 609-292-2023
Fax. # 609-292-8115

Scott A. Weiner
Commissioner

James F. Hall
Assistant Commissioner

ONJH-J91-78
October 15, 1991

Ms. Lisa A. Sullivan
Environmental Scientist
EcolSciences, Inc.
75 Fleetwood Drive, Suite 250
Rockaway, New Jersey 07866

Re: Somerset County, Hillsborough Township
760 acre parcel bisected by Mill Lane off of Amwell Road

Dear Ms. Sullivan:

Thank you for your request for information on historic and prehistoric resources in the 760 acre area under study. I am enclosing a USGS quadrangle sheet portion for the area under inquiry with accompanying text relating to the specific resources demarcated on the sheet, as well as a historical overviews for Hillsborough Township.

I am also enclosing portions of the National Register Nomination Forms for the Neshanic and Neshanic Mills Historic Districts. The area under inquiry appears to abut the Neshanic Historic District and lie partially within the Neshanic Mills Historic District. No prehistoric resources have been identified in the area under inquiry although numerous sites have been identified north of the study area along the Raritan River.

Actual comprehensive survey for historic and prehistoric archaeological resources for the area under inquiry would be necessary in order to determine the actual cultural resource potential for the various parcels within it.

Comprehensive survey for architectural resources has been completed for the area under inquiry. As mentioned above, I have enclosed the map locations, inventory sheets and historical overviews for most of the inventoried resources within or near the study area.

It is important to note that the opinions provided are those of the professional firm under contract to conduct the survey and do not represent formal opinions of State or National Register eligibility. It is also important to understand that each of the identified historical architectural sites may possess a significant archaeological component as well. In most cases, similar to any prehistoric resources which may exist in the area, the historical archaeological component of the sites has not been assessed for State or National Register eligibility.

If the project slated for this area involves federal permitting or funding, it will be reviewable under Section 106 of the National Historic Preservation Act of 1966. This would include, for example, any type of permit required for project implementation from the Army Corps of Engineers.

Section 106 of the National Historic Preservation Act of 1966 requires that federal agencies take into account the impacts that their projects might have on significant archaeological and architectural sites. The accompanying regulations (for example, 36 CFR 800) outline the process which federal agencies must follow in determining project effects. Briefly, prior to beginning any project which might damage an important site, the federal agency (or its representative) must identify (through archaeological survey, etc.) the cultural resources in the project area, and evaluate their significance.

Once the significance or importance of a site is determined, if it is eligible for inclusion in the National Register of Historic Places, the agency in consultation with the State Historic Preservation Officer (and in some cases the Advisory Council on Historic Preservation in Washington, D.C.) needs to determine the effects that their project will have on significant resources, and evaluate ways to reduce adverse effects on these sites which would result from construction of the project.

As a Deputy State Historic Preservation Officer, I frequently issue interim consultation comments throughout the process and ultimately, final Section 106 comments. Ultimately, this process may also involve preparation of a Memorandum of Agreement. For your information and use, I am enclosing a copy of "Working With Section 106" which outlines the Section 106 process in greater detail.

Under the New Jersey Register of Historic Places Act, the New Jersey Historic Sites Council reviews encroachments on sites already listed in the New Jersey Register of Historic Places, and makes recommendations to the Commissioner of New Jersey Department of Environmental Protection and Energy (NJDEPE), who is empowered under the New Jersey Register law to

authorize such encroachments. To be reviewable, the project would have to be an undertaking of a State, county or municipal government or lessee.

The Office of New Jersey Heritage receives applications to be considered at meetings of the New Jersey Historic Sites Council, and a staff member reviews each for completeness. Once complete, if the project constitutes an encroachment on a New Jersey Register site, the reviewer(s) prepare(s) a draft resolution for the project. This includes findings of fact on the project, the historic site, the likely effect of the project on the historic site, and recommendations for reducing any impacts on the site. The staff member then presents the resolution at the next meeting of the Historic Sites Council.

These meetings are open to the public and interested individuals may be given an opportunity to speak regarding projects of concern to them. On the basis of the staff and applicant presentations, the Historic Sites Council makes a recommendation to the Commissioner of the NJDEPE. Finally, the Commissioner makes a final decision, and sends a letter to the project applicant to either: 1) approve the project; 2) approve the project with conditions to be met in order to provide protection to the historic resource; or 3) deny the project.

Should this project be reviewable under either Section 106 or the New Jersey Register of Historic Places Act, either EcolSciences or another appropriate project representative should contact this Office regarding the necessary review.

Thank you again for your inquiry and for your interest in New Jersey's cultural resources. If you have any questions, please contact Deborah Fimbel of my staff.

Sincerely,

Nancy L. Zerbe
Administrator

NLZ:DRF
ER:drf5:DRF92043
Enclosures

State of New Jersey
NEW JERSEY STATE MUSEUM
DEPARTMENT OF STATE
205 WEST STATE STREET CN 530
TRENTON, N.J. 08625-0530

October 23, 1991

Ms. Lisa A. Sullivan
Environmental Scientist
EcolSciences, Inc.
75 Fleetwood Drive
Suite 250
Rockaway, NJ 07866

Re: Hillsborough, Somerset County

Dear Ms. Sullivan:

We have checked our records for the above-referenced project and report the following:

> No known archaeological resources appear to be located within the boundaries of the project site. There are two known archaeological sites located within a 2000 feet radius of the project site. An archaeological survey, by a professional archaeologist, would have to be conducted in order for an accurate assessment to be made of its archaeological significance.

If we can be of further assistance, please do not hesitate to contact us.

Sincerely,

Karen Flinn
Registrar
Archaeology/Ethnology Bureau

KF:gg
CC: Ms. Nancy Zerbe
New Jersey Department of Environmental Protection
Office of New Jersey Heritage

State of New Jersey

NEW JERSEY STATE MUSEUM
DEPARTMENT OF STATE
205 WEST STATE STREET CN 530
TRENTON, N.J. 08625-0530

November 12, 1991

Ms. Lisa A. Sullivan
Environmental Scientist
EcolSciences, Inc.
75 Fleetwood Drive
Suite 250
Rockaway, NJ 07866

Re: Hillsborough, Somerset County - 760± Acre Project Site.

Dear Ms. Sullivan:

We have checked our records for additional information on the archaeological sites located near the above-referenced project and report the following:

The two archaeological sites located within 2000 feet of the project area (28-So-102 and 28-So-104) are prehistoric archaeological sites.

If we can be of further assistance, please do not hesitate to contact us.

Sincerely,

KAR

Karen Flinn
Registrar
Archaeology/Ethnology Bureau

KF:gg
CC: Ms. Nancy Zerbe
New Jersey Department of Environmental Protection
Office of New Jersey Heritage

ATTACHMENT B

QUALIFICATIONS OF PREPARER

CORPORATE HISTORY

EcolSciences, Inc. was founded in 1973 in response to the growing need for responsible environmental planning, as mandated by NEPA, The National Environmental Policy Act. EcolSciences specializes in performing environmental investigations relating to permit acquisition and regulatory compliance, demonstration of "due diligence", waste management, impact analysis, mitigation and remediation. EcolSciences' strength is a proficiency in current environmental and waste management laws, regulations, and policies, coupled with a practical problem-solving approach to analyzing the environmental consequences of projects.

During the past twenty years, EcolSciences has successfully completed more than 2,500 studies for private, quasi-public and public clients. EcolSciences has represented some of the leading industries, developers, and financial institutions including The Home Depot, Costco Wholesale Corporation, American Cyanamid Company, Merck, Johnson & Johnson, Hartz Mountain Industries, Trammell Crow Company, Principal Mutual Life Insurance Company, Midlantic National Bank, and First Fidelity Bank. Among the many utilities that EcolSciences has served are Jersey Central Power & Light, New Jersey Natural Gas Company, Elizabeth Gas Company, Essex and Hudson County Improvement Authorities, and numerous municipal utilities authorities. Representative government agency clients include the U.S. Environmental Protection Agency and the New York City Department of Sanitation.

EcolSciences' interdisciplinary staff of environmental engineers, geologists, and scientists has extensive experience in a diversity of studies. Since the inception of the firm, EcolSciences has been involved with toxic and hazardous materials management. The firm has provided consultation to a range of industrial and commercial clients in connection with regulatory compliance; permit acquisition; waste treatment, storage and disposal;underground storage tanks; and environmental monitoring. The firm and technical staff members are certified by the NJDEPE for the performance of underground storage tank installation, closure, and subsurface evaluation. EcolSciences routinely provides tank related services, including closure plan preparation, on-site supervision of tank removal, sampling, site assessment, development and implementation of cleanup plans. All work is conducted under the supervision of a licensed professional engineer.

Since the promulgation of the New Jersey Environmental Cleanup Responsibility Act (ECRA) and it successor, the Industrial Site Recovery Act (ISRA), EcolSciences has been involved in the implementation of the entire ECRA/ISRA program for numerous industrial clients including sheet/metal, tool and dye, electronics, printing, plastics, and cosmetics manufacturing facilities. More recently, as the demonstration of "due diligence" has become a lending industry standard, EcolSciences has completed numerous Phase I and II environmental audits to clarify the level of environmental risk and liability associated with past and current practices at a particular site or facility. These audits typically include such activities as hazardous materials inventories, building and site inspections, subsurface soil investigations, groundwater monitoring, tank testing, asbestos bulk sampling, development of remediation plans and supervision of cleanup activities.

The biological staff of EcolSciences has conducted over 1500 wetland delineations and environmental assessments throughout the eastern and central portions of the United States. Our staff is skilled in all technical aspects of wetland identification and delineation methodologies established by the COE, USFWS, EPA and SCS; the assessment of wetland functions and values using techniques such as HEP and WET; the assessment of wetlands impacts; and the development of mitigation plans. In response to recent regulations governing the storage of hazardous materials, EcolSciences has participated in the development of Discharge Protection Containment and Countermeasure (DPCC) and Discharge Cleanup and Removal (DCR) plans. Environmentally Sensitive Area Protection Plans which are an integral part of the DCR plan are prepared and certified by EcolSciences' ecologists and ornithologists. Finally, EcolSciences has and continues to play an instrumental role in the development of federal environmental policies pertaining to wetlands and hazardous waste sites through a number of manuals that have been prepared under government contract for the USEPA. Recent examples include the Manual for Achieving NEPA Functional Equivalency in CERCLA Remedial Actions, Creation of Wetland Banks for Mitigation of Impacts at Superfund Sites, Technical Procedures Manual for the Advance Identification of Wetlands and a Policy Document on Wetlands Mitigation at Superfund sites.

EcolSciences is a multi-disciplinary firm that has the experience and capabilities to provide a full range of environmental services. Studies are conducted in a manner that emphasizes the balance of environmental, engineering and cost factors. This approach provides the information necessary for sound and practical project decisions.

KENNETH N. PAUL, C.E.P.

EDUCATION:

M.S., 1973 - Aquatic Biology and Ecology
Adelphi University
B.S., 1971 - Biology
City College of New York

AREAS OF EXPERTISE:

Project Management
Wetlands Ecology
Environmental Planning and Assessment
Regulatory Compliance
Site Selection and Analysis

PROFESSIONAL AFFILIATIONS:

National Association of Environmental Professionals
(Certified Environmental Professional)
Association of State Wetland Managers
Society of Wetland Scientists
Environmental Law Institute
NJDEP Freshwater Wetlands Advisory Committee

EXPERIENCE:

Mr. Paul is Vice President of EcolSciences. With more than 20 years of experience he has managed and had technical responsibility for a full range of environmental, planning and engineering projects. In addition to supervisory responsibility for environmental assignments, his areas of specialization include: environmental planning and analysis; permitting and regulatory compliance; site selection and facility location; and wetlands delineation and ecology.

For the past several years, a large portion of Mr. Paul's experience has been directly related to wetlands issues, including wetland delineation, the assessment and quantification of wetlands functions and values using computer modeling (HEP and WET), and the preparation and implementation of wetlands mitigation and mitigation banking projects. He has represented several clients before New Jersey's Wetlands Mitigation Council (the agency responsible for the Wetlands Mitigation Bank established under the Freshwater Wetlands Protection Act), and negotiated the first monetary donation to the Mitigation Bank.

Mr. Paul was selected by the New Jersey Department of Environmental Protection and Energy (DEPE) to sit on the Freshwater Wetlands Advisory Committee, which was established by the DEPE to provide input and guidance to the regulatory agency on wetlands issues, and act as an interface between the DEPE and the regulated community. Mr. Paul has spoken at many seminars and symposia on the regulatory and scientific aspects of wetlands, including presentations to the New Jersey State Bar Association, Institute for Continuing Legal Education, Institute of Business Law, National Association of Industrial and Office Parks, and the New Jersey Builders Association.

Kenneth N. Paul

Mr. Paul is a Certified Environmental Professional (CEP) by the National Association of Environmental Professionals, and is a member of several professional organizations relating to wetlands.

Mr. Paul was formerly employed by the New Jersey Department of Environmental Protection as a Senior Environmental Specialist. In this capacity he helped establish review procedures under CAFRA (New Jersey's Coastal Area Facilities Review Act), reviewed applications and EIS's submitted under CAFRA and New Jersey's Wetlands Act, and conducted the required public hearings. Mr. Paul has also held the position of Assistant Vice President and Senior Project Manager at two internationally recognized consulting organizations.

A representative cross section of Mr. Paul's project experience includes:

- Wetland delineation and 404 permit negotiations on more than 1000 residential and commercial projects throughout the northeastern United States. These projects have ranged in size from less than 10 acres to more than 1100 acres, of which sizable portions were wetlands. In addition to wetland delineation and permit acquisition activities, Mr. Paul's involvement included the preparation of mitigation plans and negotiations with state and federal regulatory agencies.

- Mr. Paul is a member of the NJDEP's Freshwater Wetlands Advisory Committee, formed to assist the agency in the implementation of the Freshwater Wetlands Protection Act. In addition, he has managed several hundred projects which required DEPE approval under the Act. These projects have required wetland delineation, transition area waivers and averaging, threatened and endangered species surveys for resource classification, individual and statewide general permit applications, and the preparation of mitigation plans.

- Environmental studies on the impacts to water quality, wetlands, and fisheries resources of a proposed 30-acre impoundment on Lickinghole Creek, VA.

- Environmental studies and permitting for a 1100 acre light industrial/warehouse/office project along the Delaware River in Gloucester County, New Jersey. This complex project required many approvals, including waterfront development, wetlands (both an individual freshwater wetlands permit and a coastal wetlands permit), stream encroachment, and a revision to the County's Wastewater Management Plan.

- CAFRA and freshwater wetlands permits for Ocean County's proposed reconstruction of Cedar Bridge Avenue in Lakewood, New Jersey.

- Wetland investigations and permit support for proposed water lines in Morris County, New Jersey.

Kenneth N. Paul

- Environmental studies and regulatory compliance activities for Jersey Central Power & Light Company's proposed VanHiseville- Whiting 230 KV Transmission Line in Ocean County, New Jersey. The alignment for this transmission line is 18 miles in length and traverses the regulated Pinelands, numerous streams, lakes, bogs and large expanses of wetlands. Environmental investigations were conducted to identify environmentally sensitive areas, recommend pole and access road locations to minimize impact, and assist JCP&L in obtaining the required federal, state and local permits and approvals.

- Environmental studies and regulatory compliance activities for JCP&L's proposed 230 KV Transmission Line in Newton and Andover Townships, Sussex County, New Jersey. This alignment traverses large expanses of wetlands and habitat for threatened and endangered species, including a fen (a rare and unique limestone marsh). This fen had been identified by the Nature Conservancy as being of significant and unusual value. Mr. Paul worked with JCP&L and the Nature Conservancy to develop mitigating measures so that the crossing of the fen would be environmentally acceptable.

- Environmental and regulatory constraint analysis for more than 150 miles of transmission line right-of-way for JCP&L. These alignments traversed lands regulated by the Pinelands Commission, CAFRA, the Corps of Engineers, and the NJDEP.

- Wetlands delineation and assessment for a 150 acre commercial office site in Parsippany, New Jersey. As part of the 404 permit process a detailed wetlands mitigation and restoration plan, including construction and maintenance activities, was prepared. The plan was accepted by the Corps of Engineers and the project received the 404 permit.

- Coastal (tidal) and freshwater wetlands delineation and habitat analyses of a 95 acre site on Barnegat Bay, Waretown, New Jersey.

- Analysis of the NJDOT's 404 Permit Application and Mitigation Plan for proposed Route 24 in Morris County. As a result of this investigation new issues were brought to the attention of the Corps of Engineers and other regulatory agencies.

- Environmental investigation and regulatory compliance activities for a proposed 5000 unit residential complex in the regulated Hackensack Meadowlands.

- Prepared CAFRA EIS's for approximately 40 residential and commercial projects in Monmouth, Ocean and Atlantic counties; and reviewed more than 30 applications and EIS's throughout the State's coastal area, including the Hope Creek Nuclear Generating Station.

- Environmental studies on the proposed improvements to N.J. Route 31, including terrestrial and aquatic ecology, land use, and surface and groundwater hydrology.

Kenneth N. Paul

- Site evaluation and suitability analysis, from the standpoints of terrestrial ecology and geohydrology, of land-based alternative for the disposal of sulfur sludge and fly ash waste from an electric generating station.

- Assessment of the ongoing operations of the United States Military Academy at West Point, New York, including impacts to The Academy's biological and aquatic resources.

- Environmental analysis and permit acquisition for a private industrial waste landfill in Sussex County, New Jersey.

- 201 Facility Plans and attendant EIS's and assessments for more than 15 sanitary sewer interceptors, collector systems and treatment plants throughout New Jersey.

DAVID M. BELL

EDUCATION:

Ph.D., 1972, Biological Sciences
Stanford University
B.A., 1967, Biology
Lehigh University

AREAS OF EXPERTISE:

Project Management
Environmental Assessment
Aquatic and Fisheries Biology
Ecological Modeling
Wetlands Biology

CERTIFICATIONS: *NJ Certified Pesticide Applicator - Aquatic Ecosystems*

EXPERIENCE:

Dr. Bell is a senior project manager with EcolSciences, responsible for the technical direction of multidisciplinary environmental studies. With 12 years of full-time consulting experience and 25 years of teaching at the university level, Dr. Bell has been involved with a wide range, and often complex array, of technical issues. His experience encompasses sampling design, data analysis and interpretation, report preparation, participation in document review processes, and expert testimony. The general environmental issues that he has addressed include environmental impact assessment, freshwater and estuarine water quality and sediment chemistry, benthic and fish community analysis, lake management studies, fisheries management and mitigation planning, wetlands evaluation and delineation, and site contamination studies (e.g., landfills, commercial/industrial sites).

Dr. Bell has had extensive experience in assessments of both terrestrial and aquatic habitats. He has carried out ecological investigations in the Patuxent, Delaware, Fresh Kills, Hudson, and East river estuaries, Long Island Sound, and Monterey Bay (CA), and has published technical papers on fisheries mitigation in estuarine environments. He has prepared environmental assessment documents for projects sponsored by the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers, the New Jersey Department of Environmental Protection and Energy, the New York Power Authority, the New York State Department of Transportation, the Port Authority of New York/New Jersey, the Pennsylvania Turnpike Authority, New Jersey Natural Gas Company, Jersey Central Power & Light, the Counties of Bergen, Essex, and Passaic, the Townships of Rockaway and Passaic, and numerous private entities.

Recently, Dr. Bell was the principal author of the handbook Principles of Environmental Assessment: An International Training Manual, prepared by EcolSciences for EPA Region III for use in facilitated training courses in Europe, South America, Africa, and Asia. The manual was used in October 1992 for an EPA course in Gdansk, Poland, and is currently being translated into Spanish for use in Mexico.

David M. Bell

A cross-section of Dr. Bell's project experience, grouped by major topical areas, includes:

- EIS/EA Preparation and/or Review: Project experience on EIS's or EA's for EPA (Edison E-TEC, Upper Passaic River Basin, Hudson River Superfund site), ACOE (Passaic River Basin Flood Control), New York State Department of Transportation (Westway), New York Power Authority (Sound Cable Project - Article VII), Port Authority of NY/NJ (Hoboken Center), New Jersey Natural Gas Company (Monmouth-Ocean Transmission Line), and many private firms (e.g., ATT, Chubb, Exxon). In addition, Dr. Bell has participated in the several phases of review of these documents (e.g., responses to comments, public hearings), has spoken at presentations to agencies such as U.S. Department of the Interior, Department of Commerce, U.S. Army Corps of Engineers, New York State Department of Environmental Conservation, New Jersey Department of Environmental Protection, and regional or local government bodies.

- Surface/Ground Water Evaluations: Project experience in evaluating and modeling impacts to surface and/or groundwater of golf courses (Copperas Ridge Golf Course Community, NJ; Royce Brook Golf Club, NJ), septic systems, and stormwater runoff. Dr. Bell recently performed an extensive statistical analysis of the EPA/NJDEP water quality data base for the Great Swamp (NJ) watershed to evaluate point and non-point source loadings and influences. In 1992, he completed a one-week EPA workshop in use of EPA's PIRANHA (Pesticide and Industrial Chemical Risk Analysis and Hazard Assessment) model.

- Water Quality, Benthos, and Sediment Chemistry: Project experience on Hudson River (Westway, Riverwalk, Hoboken Center, Port Liberte, ARCORP, Nyack Marina), Long Island Sound (Sound Cable Project, Davids Island, Northport Marina), Delaware River (Tinicum NEC), and Arthur Kill (Fresh Kills Sanitary Landfill).

- Fisheries Evaluations: Project experience in estuarine fish communities in the Hudson River, Arthur Kill, Long Island Sound, Delaware River (PA), and Patuxent River (MD), fresh-water fish communities in the Tittibawassee River (MI), Sutherland Reservoir (NE), Saucon and Bushkill Creeks (PA), Mirror, Crystal and Olympia Lakes (NJ), and the Passaic River drainage basin (NJ).

- Wetlands Evaluation and Delineation: Project experience in wetland delineation, habitat assessment, impact analysis and mitigation at sites in New York (Westchester and Rockland Counties) and New Jersey (Morris, Passaic, Middlesex, and Bergen Counties). Dr. Bell has also prepared wetland regulatory guidance brochures and handbooks for EPA's Section 404 public outreach program in New York State.

- Lake/Stream Management: Project experience at Buckkill Falls, Kriss Pines Hatchery, Beaver Creek, Pocahontas Lake (all PA); Sutherland Reservoir (NE), Mirror, Crystal, Wonder, Cedar, White Meadow, and Olympia lakes (all NJ).

David M. Bell

- Mitigation Planning: Project experience in palustrine and estuarine wetlands creation/restoration/banking (Fresh Kills, NY; Monmouth County, NJ), estuarine fisheries (Westway Mitigation Plan, NY), lake fisheries management (Sutherland Reservoir, NE; Mirror Lake, Lake, NJ), and stormwater management (Rockaway Township and West Milford Township, NJ). Dr. Bell's analytical approaches to mitigation planning and decision-making have been published in conference proceedings.

- Contaminant Studies: Project experience dealing with landfill leachate (Tinicum NEC, PA; Fresh Kills, NY), soil/groundwater at commercial sites (Raritan Arsenal, NJ; NYS&W Railroad Maintenance Facility, NJ), heavy metals (Saucon Creek, PA), PCB's (Hudson River striped bass, NY), suspended solids (Kriss Pines Hatchery, PA), and synthetic dielectric fluid and dredge spoils (Long Island Sound, NY). Managed and/or evaluated ECRA studies in East Hanover, Ridgefield, and Randolph (NJ). Preparation of numerous Phase I Environmental Audits pursuant to New Jersey's ECRA/ISRA regulations.

SELECTED PUBLICATIONS

Bell, D.M. Spectral sensitivity and color-oriented behavior in two species of cichlid fish. Doctoral thesis, Stanford University, 1972.

Bell, D.M. Effects of a zinc mine ground water effluent on a stream diatom community. Pa. Acad. Sci. 51:51-53. 1977.

Bell, D.M. Physiological and psychological spectral sensitivities of the cichlid fish (Hemichromis bimaculatus). J. Exp. Zool. 223:29-32. 1982.

Bell, D.M., R.A. Alevras, S.A. Arnold, K.A. Abood, and G.R. McVoy. Fishery mitigation in an estuarine environment. In: Proceedings of the Fourth Symposium on Coastal and Ocean Management (O.T. Magoon ed.). Vol 1: 177-191. 1985.

Bell, D.M., K.A. Abood, R.A. Alevras, G.R. McVoy. Analysis of habitat characteristics and fisheries abundance characteristics in habitat-loss mitigation planning. In: Brodtmann, N.V. Jr. (ed.) Second Water Quality and Wetlands Management Conference Proceedings. New Orleans, LA, Oct. 24-25, 1985.

DAVID P. MOSKOWITZ

EDUCATION:	*B.A., 1984 - Environmental Studies* *George Washington University* *Washington, D.C.*
AREAS OF EXPERTISE:	*Ecological Assessment and Regulatory Compliance*
PROFESSIONAL AFFILIATIONS:	*Society of Wetland Scientists* *Association of Field Ornithologists*
PROFESSIONAL CERTIFICATIONS:	*Professional Wetland Scientist - SWS* *Certified Wetland Delineator - Corps of Engineers* *USEPA Wetland Delineation - WTI* *HAZMAT - 24 Hour Initial Site Operations - OHSA* *Airport Animal Damage Control - USDA* *N.J. Licensed Pesticide Applicator: Aquatic Ecosystems -NJDEP* *Qualified Ornithologist - NJDEP* *Management and Technical Development - IMCC*
OTHER:	*Identification of Sedges and Rushes - Rutgers University* *Field Identification of Raptors - University of Maine* *USFWS N.J. Breeding Bird Survey Route Coordinator - 1991-1992*

EXPERIENCE:

During the past 10 years, Mr. Moskowitz has conducted more than 1,500 environmental studies for a wide range of clients including local, state and federal government agencies, and the development, legal, engineering and financial professions. For the past eight years as an environmental scientist and project manager with EcolSciences, Inc. primary responsibilities have been project management, the design and implementation of technical field studies, and regulatory analysis and compliance. A summary of relevant project experience includes:

<u>Wetland Studies</u>

Directed and participated in more than 1,000 field studies in NJ, NY, PA, MD and CT evaluating all aspects of wetland ecology. Representative experience includes:

- The evaluation of more than 10,000 acres in the New Jersey Highlands.
- The evaluation of more than 7,500 acres in the complex red soils of the New Jersey Piedmont.
- The evaluation of nearly 3,000 acres on Staten Island, New York.

David P. Moskowitz

Wetland Mitigation Studies

Numerous mitigation plans have been prepared to remedy regulatory violations of various State and Federal wetland laws, and to compensate for wetland losses resulting from permitted wetland fills. Two examples of the wide variety of studies include:

- Preparation of mitigation plans and specifications for the remediation of wetlands and shorelines of the Freshkills Sanitary Landfill, Staten Island, New York.

- Design and implementation of a 13-acre wetland restoration project in Morris County, New Jersey utilizing air conditioning condensation as a hydrologic supplement.

Threatened and Endangered Species Studies

- Designed, directed and participated in numerous field studies for rare plant and animal species including Bog Turtle, Wood Turtle, Northern Pine Snake, Blue Spotted Salamander, Long Tailed Salamander, Pine Barrens Tree Frog, Great Blue Heron, Coopers Hawk, Grasshopper Sparrow, Savannah Sparrow, Upland Sandpiper, Barred Owl, Swamp Pink, Kneiskern's Beak Rush, Curly Grass Fern and Barrett's Sedge.

- Performed an evaluation of eight NJ Superfund sites to determine the potential occurrence of the federally threatened plant species, Swamp Pink and Knieskern's Beaked Rush, for the USEPA.

- Prepared a sampling plan, established permanent quadrats and collected the first round of field data in a NJDEP-mandated 20-year study of the effects of the removal of groundwater from one watershed to another upon the existing plant communities of Budd Lake Bog due to the construction of sanitary sewerage facilities. Budd Lake Bog is known to harbor several species of rare plants and is the northernmost occurrence of the Federally-threatened plant, Swamp Pink.

Ornithological Studies

Numerous studies conducted throughout the northeast designed to evaluate and census individual species, avian communities and habitats, to assess potential impacts upon the species and habitats associated with land development proposals, and to comply with State and Federal Wildlife regulations. Two examples of the wide variety of studies include:

- Long-eared owl habitat evaluation, pellet analysis and management plan in Somerset County, New Jersey.

- Two-year avian census, habitat evaluation and regulatory assessment for the proposed redevelopment of Flushing Airport in Queens, New York by the New York City Economic Development Corporation. Breeding, wintering and migratory utilization of the site was comprehensively evaluated and barn owl pellet analysis was conducted to augment small mammal population studies.

David P. Moskowitz

Commercial/Residential/Industrial Studies

More than 1,000 properties have been evaluated throughout NJ, NY, PA, and CT to assess potential environmental impacts from proposed development and to insure regulatory compliance with various Local, State and Federal environmental laws. Tasks have included wetland delineation, permit acquisition and mitigation planning.

Corridor Studies

- Designed, directed and participated in ecological studies and regulatory assessments for more than 300 linear miles of road corridors, gas and electric transmission right of ways and sewer and water alignments. Studies have been performed for the New Jersey Turnpike Authority, New Jersey DOT, Jersey Central Power and Light, New Jersey Natural Gas, and numerous local governments.

Special Environmental Studies

A wide range of ecological studies have been conducted for various private clients, the USEPA and other government agencies. Representative studies include:

- An evaluation of the impacts of peat extraction on the functions and values of peatlands in the Pocono Mountain area of Pennsylvania for the USEPA, Region III.
- Habitat assessments for Pine Barrens Tree Frog and River Otter in New Jersey.
- An avifaunal study of a 500-acre proposed incinerator ash landfill site in New York, conducted for a county agency, to evaluate FAA concerns about bird strike hazards to aircraft passing over the site, resulting in the preparation of a Bird Deterrent Plan.
- Biological studies of the impacts of Folcroft Landfill upon ecological communities of Tinicum National Environmental Center, Philadelphia, PA for the USEPA, Region III.
- Red-Headed Woodpecker evaluation of two central New Jersey properties.
- Environmental Assessment and Regulatory Review of the proposed Peter's Brook Stream Rehabilitation prepared for the Town of West Caldwell, New Jersey.
- Annual monitoring report for Wetland and Transition Area Restoration Project in Somerset County, New Jersey.
- Natural Resource Inventory for a 500-acre proposed golf course and commercial development in Somerset County and Hunterdon County, New Jersey.