PINELANDS PRESERVATION ALLIANCE

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May 20, 2015

Karl Hartkopf, PP AICP
Acting Director of Research
Office for Planning Advocacy
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P.O. Box 820
Trenton, NJ 08625-0820

RE: Manchester Township Proposed Map Amendment, Block 52, Lot 2

Dear Mr. Hartkopf:

I attended the public hearing for the map amendment that would result in 22.14 acres in Manchester Township being changed from a Planning Area (PA) 5 to a Planning Area (PA) 2. The documents that were posted on the website for this change indicated that the property was the subject of much analysis. But when I inquired about the additional information I found none available.

This stream corridor area was made a PA5 during the mid 1990's after the NJ DEP gave the Manchester Township Environmental Commission a grant to examine and look for ways to protect the Township's stream corridors. A wide stream corridor both above and below Block 52, Lot 2 has remained since this study was completed. Although there was one earlier CAFRA permit that may encroached more into the buffer area than the Environmental Commission would have liked, the stream corridor is mostly in public ownership and the 22.14 acres should remain as a PA5. I have attached a map showing in green the "public" lands along this stream corridor.

The Manchester Master Plan defines environmentally critical areas as "an area or feature which is of significant environmental value, including by not limited to: stream corridors, natural heritage priority sites, habitat of endangered or threatened species, large area of contiguous open space or upland forest..." All the features this piece of land has and because Manchester Township has hurriedly change the zoning before an election (and now is being redone) doesn't change the fact that this land meets the definition in the Master Plan.

Much planning has also gone into the protection of the stream corridor above Block 52, Lot 2. The Pinelands Commission in 2004 completed a study called "A Regional Natural Resource Protection Plan for the Toms River Corridor in Jackson and Manchester Townships." This study (attached) lays out many reasons why the steam corridor of the Toms River and its tributaries needed better protection from development impacts.

After this study was completed both Jackson and Manchester passed ordinances giving the stream portions within the Pinelands Protection Area bigger buffers. In Manchester this also included the Ridgeway Branch. The Pinelands Protection border is only about 3,000 feet from the property to be changed from PA5 to PA2.

Below Route 70 the Ridgeway continues to Pine Lake and then to the Toms River with most of the land being in public ownership. The portion of the Toms River which the Ridgeway flows into is designated as a C1 stream with a 300 foot buffer requirement. Attached is a map made from DEP's NJ Geo Web showing the Toms River which the Ridgeway flows into just downstream from Pine Lake.

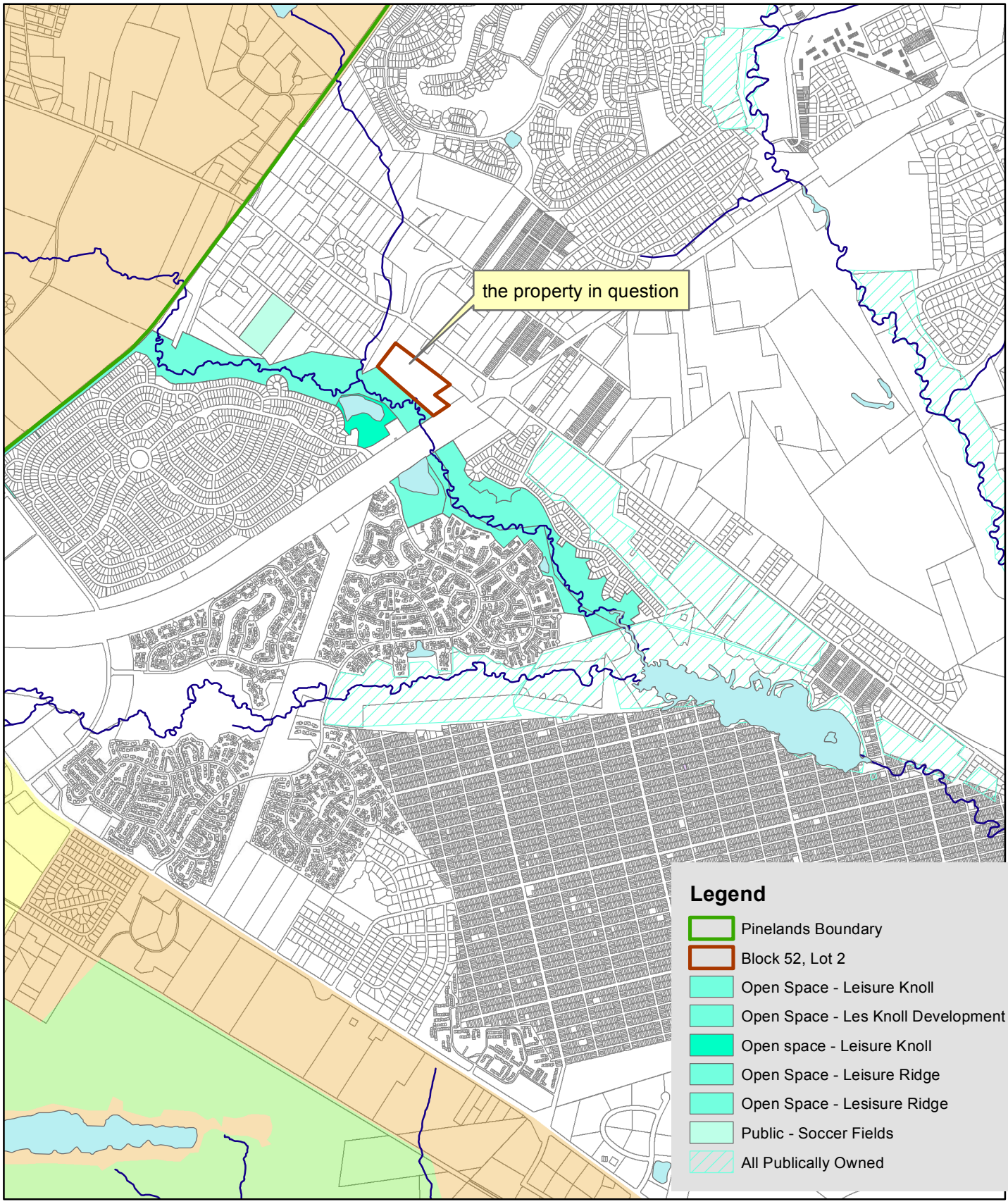
The attached documents, for this change, also indicates that consultants for the property owner have stated "while the site may have some suitability for disbursing rattlesnakes from distant locales, the onsite habitat is not of great significance" but all the data in the NJ Pinelands Toms River Corridor study shows that the power line right of way that goes through Block 52, Lot 2 is known habitat for Northern Pine Snakes. While portions of this lot may not be habitat for the timber rattlesnake it is defiantly habitat for other snakes.

With so much good planning over a long number of years that has gone into the protection of the stream corridors in Manchester and Jackson Township -why support this drastic change?

Respectfully submitted,

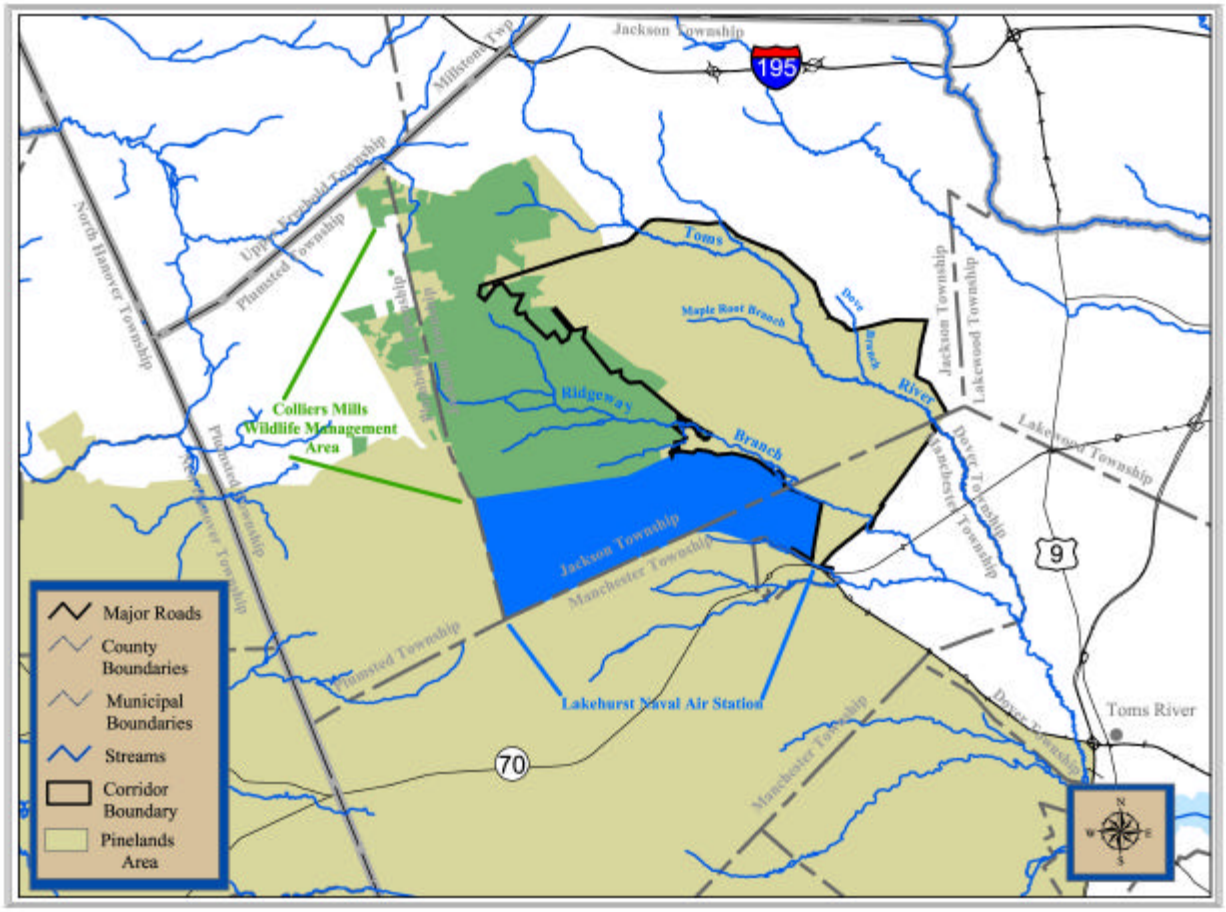
Theresa Lettman

Theresa Lettman
Director of Monitoring Programs



Manchester Township - Open Spaces

A REGIONAL NATURAL RESOURCE PROTECTION PLAN
for the
TOMS RIVER CORRIDOR
JACKSON AND MANCHESTER TOWNSHIPS
OCEAN COUNTY, NEW JERSEY



TOMS RIVER CORRIDOR TASK FORCE
FEBRUARY 2004

A Regional Natural Resources Protection Plan
For the Toms River Corridor
Jackson and Manchester Townships
Ocean County, New Jersey

TOMS RIVER CORRIDOR TASK FORCE
FEBRUARY 2004

TOMS RIVER CORRIDOR TASK FORCE

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Emile DeVito	New Jersey Conservation Foundation
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Cindy Gilman	The Trust for Public Land
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Robert Zappalorti	President and Executive Director, Herpetological Associates, Inc.

ACKNOWLEDGMENTS

This project would not have been possible without the support of the 15-member Pinelands Commission and its Permanent Land Protection Committee. Ms. Candace McKee Ashmun, Chair of the Permanent Land Protection Committee, was a chief proponent of this sub-regional planning process and participated in many of the Task Force's meetings.

In addition to the Task Force and its technical contributors, Pinelands Commission staff played a pivotal role in the creation of this report. From the Land Use Program, Rich Federman, Larry L. Liggett, Susan R. Grogan, Kim Beidler, Jessica Kubida, and Chris Krupka assisted with writing and editing the report. Russell Davis and David Rickert in the Office of Geographic Information produced the maps and associated land use data. From the Science Office, Robert Zampella, John Bunnell, Kim Laidig and Nicholas Procopio provided guidance and scientific data and references, and reviewed several drafts of the report. From Regulatory Programs, Chuck Horner, Karen Young, Donna McBride, Jean Montgomerie, Ken Carter and Edward Wengrowski provided guidance and data on threatened and endangered species surveys and recommended approaches.

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PREFACE

The Task Force submits this report and its recommendations to Jackson Township, Manchester Township, Ocean County, and the New Jersey Pinelands Commission for consideration. Based upon its analysis of available natural resource and land use data, the Task Force recommends that resource conservation and future community development goals in the 17,000 acre Toms River Corridor can best be met through a combination of new zoning, development and other land protection initiatives. Implementation of the plan's recommendations will, for example:

1. Better protect important natural resources through rezonings.
   - ?? Development oriented zoning districts will be reduced by 1,850 acres.
   - ?? The most protective zoning classification (Forest Area) will be increased by 1,400 acres.
   - ?? 73% of the Corridor will be included in protective zoning classifications.

2. Greatly reduce fragmentation of the landscape.
   - ?? Mandatory clustering provisions will permanently protect 92% of the 11,000 acres in conservation oriented zoning districts within the Forest and Rural Development Areas.
   - ?? Enhanced buffers along stream corridors will help to ensure landscape contiguity.

3. Heighten county and municipal acquisition efforts.
   - ?? 2,000 acres of land are currently targeted for public purchase.

4. Lessen development impacts by reducing the number of new homes in the region by 2,600.
   - ?? Impervious coverage should be at least 300 acres less.
   - ?? Pollution loading should be at least 700,000 gallons per day less.
   - ?? Water supply demands and wastewater exportation should be 600,000 gallons per day less.

5. Make development in designated development zones more predictable.
   - ?? Lower base densities in the Regional Growth Areas will make Pinelands Development Credit use more realistic.
   - ?? An innovative zoning provision in the PED zone will protect known habitat for rare plants and animals while facilitating development elsewhere on the tract.

6. Simplify the development application process.
   - ?? Threatened and endangered species surveys will not be required in most of the designated development zones.
   - ?? Threatened and endangered species surveys in conservation zones can be avoided or reduced in scope when design standards are followed.

It should be noted that, even though these recommendations are based upon a wealth of natural resource and land use data, they do not reflect environmental inventories of each and every property within the Corridor. Although the Task Force believes thatall of the report's recommendations need to be implemented to the fullest extent possible, it also recognizes that refinements may be necessary during the implementation phase to address new information or to resolve other conflicts that may arise. The members of the Task Force and the agencies they represent are prepared to reconvene if and when needed to help during the implementation phase or to provide technical assistance in other ways.

I. BACKGROUND INFORMATION

A. The Toms River Corridor

On April 10, 2003, the Pinelands Commission authorized its Permanent Land Protection Committee and its staff to pursue land protection initiatives within the Toms River Corridor, a portion of the Barnegat Bay watershed located within the Pinelands Area of Jackson and Manchester Townships in Ocean County. The Toms River Corridor encompasses nearly 17,000 acres, including approximately 15,000 acres in Jackson Township and 1,800 acres in Manchester Township. The Corridor comprises 21% of the 124 square miles of the Toms River Watershed, which extends from its headwaters in western Monmouth and Ocean Counties to Toms River in Dover Township where the river reaches the Barnegat Bay.

The Toms River Corridor accounts for 23.4 of Jackson Township's 100 square miles and 2.8 of Manchester Township's 80 square miles. The Corridor surrounds the Toms River and one of its major western tributaries, the Ridgeway Branch. The Corridor includes approximately 7.8 miles of the Toms River main stem and 4.6 miles of the Ridgeway Branch.

The Toms River Corridor contains extensive tracts of forest, sandy scrublands, surface waters, and a variety of wetland ecosystems. Publicly owned lands interspersed throughout the Corridor, as well as Colliers Mills Wildlife Management Area (WMA) to the southwest, provide habitat for a wealth of plant and animal species, many of which are indigenous to the Pinelands and some of which are classified as threatened or endangered. In additi on, the Corridor is currently home to several thousand people and is facing mounting development pressures.

The Corridor includes four of the nine Pinelands Management Areas: the Forest Area (FA), Rural Development Area (RDA), Regional Growth Area (RGA), and Pinelands Villages (PV) (Figure 1). Specifically, the Pinelands Villages within the Corridor are Cassville, Legler, and Vanhiseville, which are located at the edges of a large forested area. Significant parts of the landscape have been altered by past and current sand, gravel, and mineral mining operations within the Rural Development Area in the central and southeastern portion of the Corridor. The Regional Growth Area, slated for more intensive development, rings the eastern edge of the study area.

The Corridor is adjacent to two other Pinelands Management Areas, the Preservation Area District (PA) (Colliers Mills WMA) and a Military and Federal Installation Area (Naval Air Engineering Station Lakehurst). Naval Air Engineering Station (NAES) L akehurst covers 7,200 acres and straddles the Jackson-Manchester boundary. Colliers Mills WMA covers nearly 10,000 acres of Preservation Area within the Pinelands Area and another 3,000 in the Pinelands National Reserve.

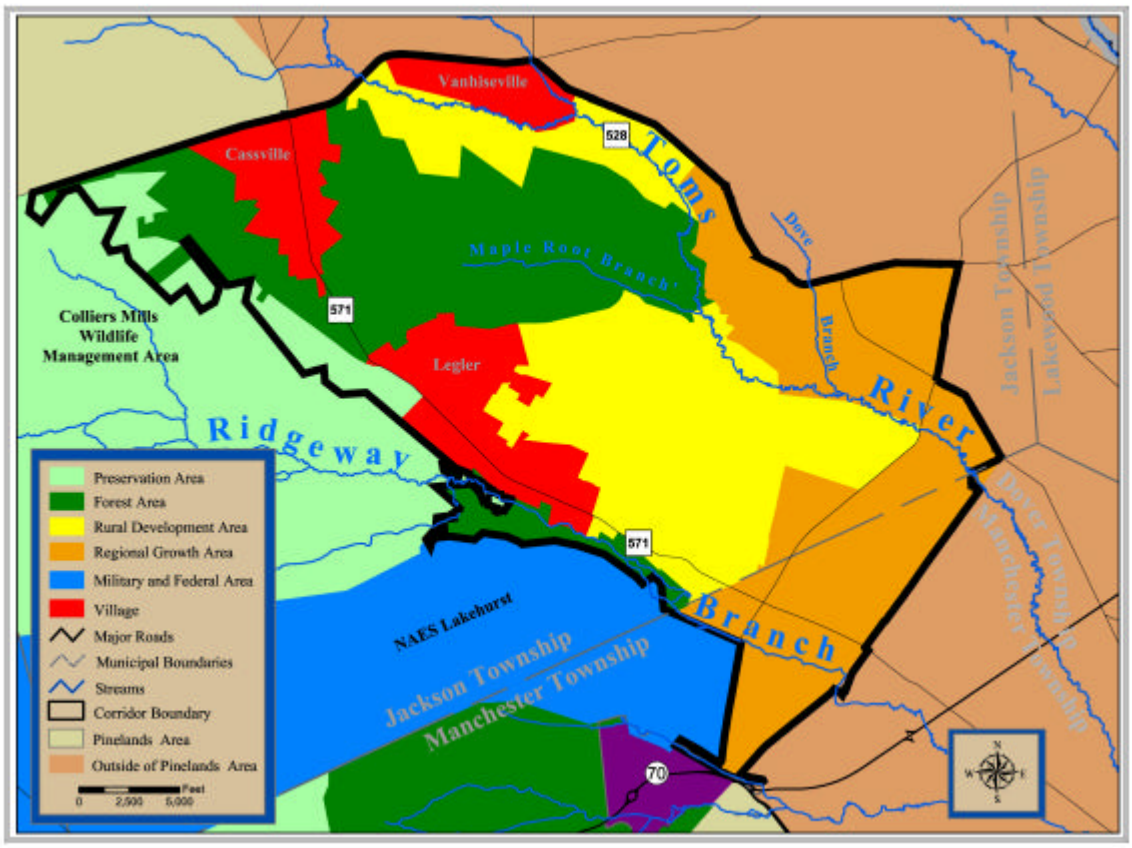

Figure 1. Pinelands Management Areas.

Appendix A provides further descriptions of the six Pinelands Management Areas located in and adjacent to the Toms River Corridor.

B. Reasons for Pursuing a Natural Resource Protection Plan for the Toms River Corridor

The New Jersey Pinelands Commission is charged with preserving, protecting, and enhancing the natural and cultural resources of the Pinelands National Reserve, and encouraging compatible economic and other human activities consistent with that purpose. That mission, on a smaller geographic scale, led the Commission to create the Toms River Corridor Task Force. The goal of the Task Force is to develop a comprehensive plan and implementation strategy for directing development in the Corridor into clustered areas while preserving important natural resources, wildlife habitat, and open space.

Development within the Corridor is guided by the land use and resource protection standards specified in the Pinelands Comprehensive Management Plan (CMP), which designates different management areas throughout the Pinelands that permit varying types and intensities of development. While the CMP has been quite successful in directing development to appropriate management areas (Bunnell et al., 2003), occasionally its land use strategy conflicts with natural resource protection, especially in cases where threatened and endangered (T&E) plant and animal species are discovered in areas previously

designated for growth. Concern about such development conflicts with protection of the threatened northern pine snake, as well as development-related impacts, including sprawl, traffic, providing municipal services, water quality and quantity, and providing and linking open space, began the effort to examine the Toms River Corridor area more closely. Through this effort, the Task Force developed recommendations for applying appropriate planning and development regulatory techniques and other tools to mitigate existing problems and avoid future ones.

C. The Participants in the Process

Recognizing the need for coordinated action to address the presence of T&E species in areas slated for development, the Pinelands Commission's April 10, 2003 resolution (Appendix B) authorized the formation of the Toms River Corridor Task Force. The creation of this Task Force was seen as a means of bringing experts together in a highly focused effort, with a strong base of support across the environmental, planning, and regulatory agencies. The Task Force was asked to assess the natural resources of the Corridor, prioritize protection areas, suggest and implement land protection strategies, and craft a regional land use/protection document for the area, which could then be reviewed and implemented by the Townships, County, and Pinelands Commission, as appropriate.

Twenty individuals representing natural resources, planning, and governmental interests were invited to participate on the Task Force. In addition to Jackson Township, Manchester Township, and Ocean County officials, representatives from a variety of offices in the New Jersey Department of Environmental Protection (NJDEP), including the Endangered and Nongame Species Program, the Division of Watershed Management, the Office of Policy, Planning and Science, the Green Acres Program, and the Water Monitoring Program participated. Also participating were representatives from the New Jersey Audubon Society, New Jersey Conservation Foundation, Pinelands Preservation Alliance, and the Trust for Public Land. Naval Air Engineering Station Lakehurst, located on the southern edge of the Corridor, was represented both by its Commanding Officer and by members of the Friends of Navy Lakehurst organization.

The Pinelands Commission's Executive Director, Director of Land Use, Chief Planner, and staff from the planning, science, and regulatory offices supported the work of the Task Force. The Nature Conservancy and the U.S. Geological Survey also provided support. A full list of participants can be found in the beginning of the document.

D. Task Force Goals

In recognition of the significant ecological attributes associated with the Toms River Corridor, which will be discussed further in subsequent sections of this report, the Toms River Corridor Task Force was formed and charged with the creation of a natural resource conservation plan for the area. When fully implemented, the concepts and strategies put forth in the plan will help to better protect those natural resources and reflect municipal planning goals for the area.

Specifically, the Plan is intended to address the following six goals:

Ecological Goals

1. Protect threatened and endangered species populations.
2. Preserve and enhance Pinelands landscapes.
3. Protect water resources.

Land Use and Development Goals

4. Establish zoning compatible with conservation and municipal planning objectives.
5. Promote environmentally sustainable development principles.
6. Provide for compatible residential, commercial, and industrial development opportunities.

II. Land Use and Natural Resources

A. Land Use

The term "development" includes residential dwellings, recreational facilities, commercial establishments, manufacturing and industrial operations, and agricultural structures. Existing development can best be illustrated by land cover (Figure 2) and future development activity is best shown by parcel (Figure 3). A broad range of development is found within the Toms River Corridor, although the majority of existing and planned development is in the form of residential housing. Most of the existing development is found within the Regional Growth Areas in Manchester and Jackson Townships and the three Pinelands Villages in Jackson Township.

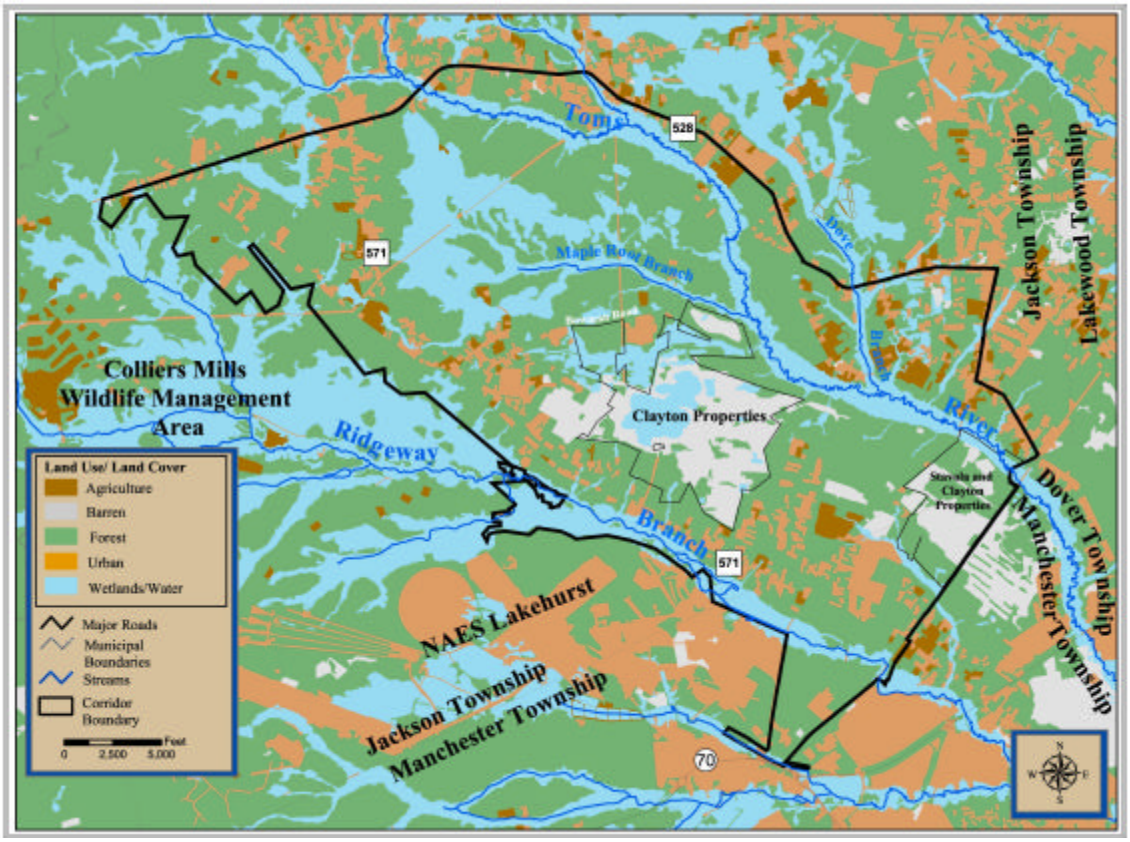

Figure 2. Land Use/Land Cover

1. Existing Land Use and Active Development Applications

Table 1 categorizes land within the Corridor as developed, vacant, or publicly owned (Figure 3). An analysis was conducted on a parcel-by-parcel basis using tax assessment data that was verified by examining year 2000 aerial photographs to delineate existing land use patterns.

Table 1. Summary of Land Use Status in the Toms River Corridor.

Land Use Status	Acres
Developed	4,669
Public	2,773
Vacant	9,388
TOTAL	16,830

Development of one-acre lots for residential use is permitted in the three Pinelands Villages and the more intensively zoned Rural Development Areas in Jackson Township. There has been a demand for larger, multiple-acre lots, particularly north of the Toms River in Jackson Township, despite the fact that a development density of greater than one dwelling unit per acre is permitted in the Regional Growth Areas. Large senior housing communities are also being built. In January 2004, at least one dozen residential development projects of 10 or more dwelling units were proposed within the Corridor. These projects are located within the Villages of Cassville and Legler, on both banks of the Toms River, and in the Manchester Township Ridgeway Regional Growth Area. One retirement community project in

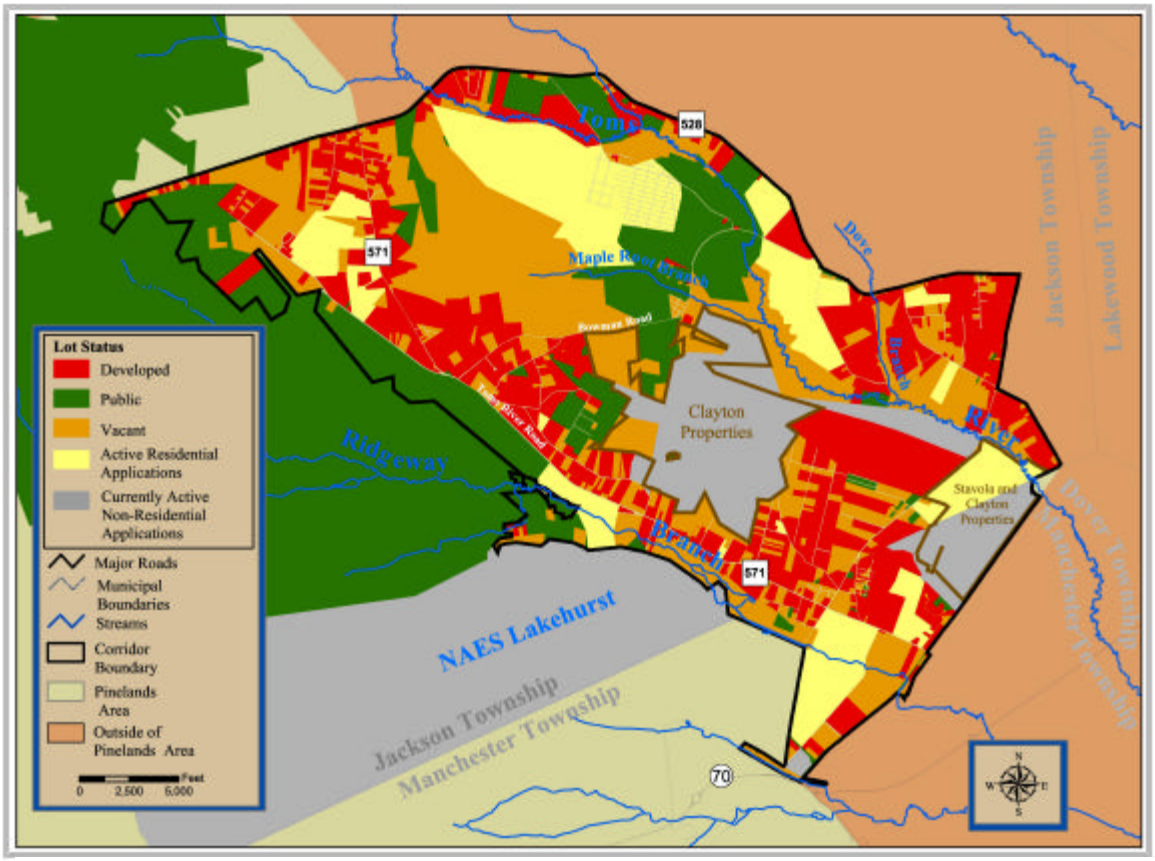

Figure 3. Existing Land Use and Active Development Applications.

Manchester Township has been approved for 500 dwelling units. These projects are in various stages of completion in respect to the permitting process, with some just starting the process and others near groundbreaking. In addi tion to these larger projects, a number of smaller development applications are pending, ranging from single dwellings on individual lots up to an eight-lot subdivision. In all, approximately 1,500 residential units have already been proposed for construction within the Toms River Corridor (Figure 3).

2. Land Cover

Table 2. Summary of Land Use/Land Cover in the Toms River Corridor.

Land Use/Land Cover	Acres
Agriculture	520
Barren Land (e.g. mining)	1,290
Upland Forest	8,994
Urban (e.g. residential)	1,716
Wetlands (incl. water bodies)	4,310
TOTAL	16,830

Land cover refers to the natural and cultural features on the land surface (Figure 2). While residential development represents the majority of new development applications, resource extraction remains a significant aspect of the region and mining permits conti nue to be granted on the Clayton and Stavola/Clayton properties (Figure 3). The Clayton mining site comprises some 1,800 acres within a specially created RD-9 Rural Development zone located in the central portion of the Corridor between the Toms River and Legler Village. Another mining area, the Stavola/Clayton tracts, comprises five large parcels that total 615 acres. It is located in the Regional Growth Area along the Jackson -Manchester boundary, with three lots in Manchester Township and two lots in J ackson Township. This site has not been significantly mined in recent years, but remains largely cleared of vegetation and has been the subject of discussions related to possible high-density residential development.

NJDEP's 1995/97 land use/land cover data set was created using interpretation of aerial photography and digital aerial imagery, and places land cover into one of five categories: agriculture, barren land, upland forest, urban and wetlands (including waterbodies). As summarized in Table 2, a pproximately 1,300 acres within the Corridor were categorized as barren land, almost all associated with resource extraction operations. Active mining sites are typically heavily disturbed, treeless sandy zones, occasionally with large artificially created surface waterbodies. The lands that lay on the fringes of these sites range from sparsely vegetated to pine-oak or oak-pine forest cover.

B. Natural Resources

1. Landscape

The assemblage of species, landscapes, and ecosystems that make up the New Jersey Pinelands is truly unique, not only at a local or national scale but also internationally. The Toms River Corridor mirrors this uniqueness.

There are large expanses of upland and wetland forest in the Toms River Corridor and surrounding areas (Figure 4). Based on 1995 NJDEP data, there are nearly 9,000 acres of upland forest on private and public land within the Corridor. (It should be noted that portions of this forest were already minimally developed in 1995, have been cleared for development in the years since then, or are included in proposed development projects). The most significant at-risk area of relatively unbroken forest is located between the three Villages. This forest, which encompasses 3,600 acres, is comprised of characteristic Pinelands vegetation types, including pine-oak or oak-pine forest, dominated by pitch pine and scarlet, chestnut, white and other oaks. Hardwood swamp forests and, in some locations, Atlantic White Cedar swamps, are found closer to the streams. The species that these habitats support are likewise part of an assemblage that uniquely characterizes New Jersey's Pinelands.

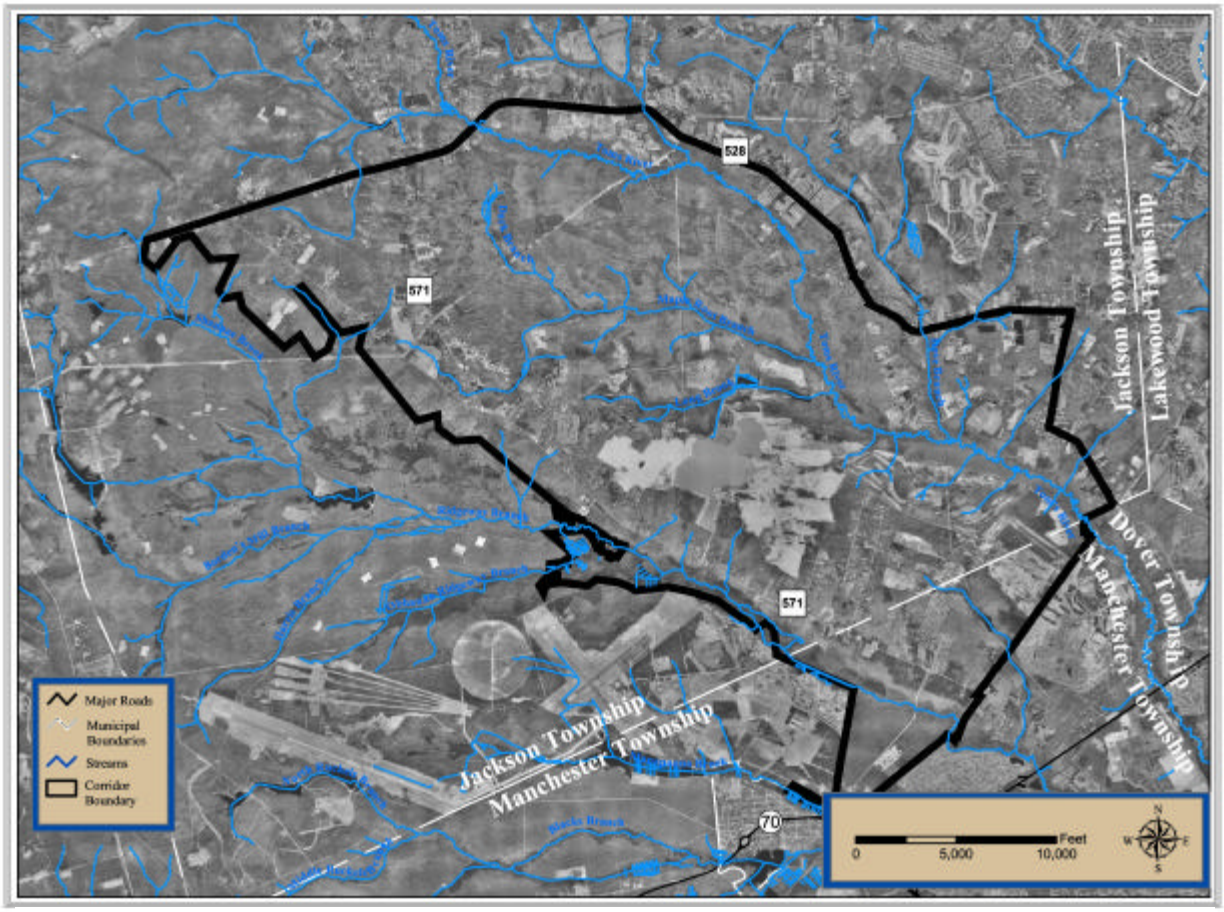

Figure 4. Aerial View of the Corridor with Toms River and Tributaries.

Within the Corridor, more than 2,700 acres are publicly-owned land (Figure 15). There is also a state-operated forestry and horticultural research center, which is located in Jackson Township along the northern bank of the Toms River.

As mentioned previously, the Toms River Corridor is proximate to areas recognized as some of the most characteristic of the Pinelands, including Byrne State Forest, the Greenwood Forest Wildlife Management Area, and the Colliers Mills WMA. In fact, although much of Fort Dix remains forest, if not for the developed portions of the military bases at Fort Dix and Lakehurst, the Corridor would form the northern extent of an unbroken stretch of Pinelands landscape extending southward to Wharton State Forest in the heart of the Pinelands Area.

2. Water Resources

The Toms River enters the Corridor from the west at the point where the main stem and its tributary branch converge just east of the Village of Vanhiseville and flows southeast into Manchester Township.

Several tributaries of the Toms River traverse the Corridor, most notably the Ridgeway Branch and the Maple Root Branch. The Ridgeway Branch drains Colliers Mills WMA before passing through Legler Village, runs north of Naval Air Engineering Station Lakehurst, then continues into Manchester. The Maple Root Branch originates in the Forest Area north of Colliers Mills WMA and passes through state lands before joining the main stem of the Toms River in the central portion of the Corridor.

These streams, along with their smaller tributaries, have wetland complexes associated with them. Analysis of 1995 NJDEP land use data indicates that approximately 4,300 acres of wetlands are found within the Corridor (or about 25% of the total acreage of the Corridor) (Table 2, Figure 2). Most of these wetlands are located within the heavily forested western portion of the study area. Those found in the eastern portion of the Corridor are strictly associated with the Toms River and Ridgeway Branch. Thousands of additional acres of wetlands are located within the boundaries of Colliers Mills WMA and the Lakehurst base.

a. Surface Waters

Surface water quality is a major determinant of the essential character of the Pinelands region (Dow and Zampella, 2000). Streams draining forested or undisturbed watersheds are typically acidic and nutrient-poor (Morgan and Good, 1988; Zampella, 1994). In contrast, streams draining developed lands or lands disturbed by agriculture display elevated pH and dissolved-solid concentrations (Morgan and Good, 1988; Watt and Johnson, 1992; Zampella, 1994; Johnson and Watt, 1996).

The most recent surface water quality data available for the Toms River Corridor was collected by the Pinelands Commission Science Office staff between January and November 2003. Table 3 and Figure 5 summarize the sampling data. According to this

data, it appears that there is degraded water quality in the main stem of the Toms River that is probably associated with existing adjacent upland agriculture and developed lands.

Table 3. Median pH and Specific Conductance for Commission Monitoring Sites in the Toms River Corridor Area.

Site	Site Description	pH	SC
A	Toms River tributary at impoundment above Rt 571	5.3	50
B	Toms River at Rt 528	6.0	130
C	Toms River tributary at Rt 528 near Van Hiseville	6.0	180
D	Toms River at Bowman Road	6.0	138
E	Maple Root Branch at Bowman Road	4.1	70
F	Long Branch at powerlines (off Bowman Road)	4.3	56
G	Dove Mill Branch at Rt 528	5.2	73
H	Dove Mill Branch at Grawtown Road	5.3	87
I	Toms River at South Hope Chapel Road (Rt 547)	5.5	114
J	Cabin Branch at Railroad tracks (off Rt 571)	6.1	120
K	Shannae Brook at cranberry bog (Colliers Mills WMA)	4.6	59
L	Shannae Brook tributary at Colliers Mills WMA (outlet of Turn Mill Pond)	6.3	82
M	Bordens Mill Brook at Colliers Mills WMA	4.6	37
N	Shannae Brook at Colliers Mills WMA (Success Lake)	4.5	58
O	Ridgeway Branch near Collier Mills WMA	4.2	64
P	Ridgeway Branch at Rt 571	4.3	65
Q	Ridgeway Branch at Lakehurst-Ridgeway Road	4.5	70

SC=specific conductance ($\mu S\ cm^{-1}$)

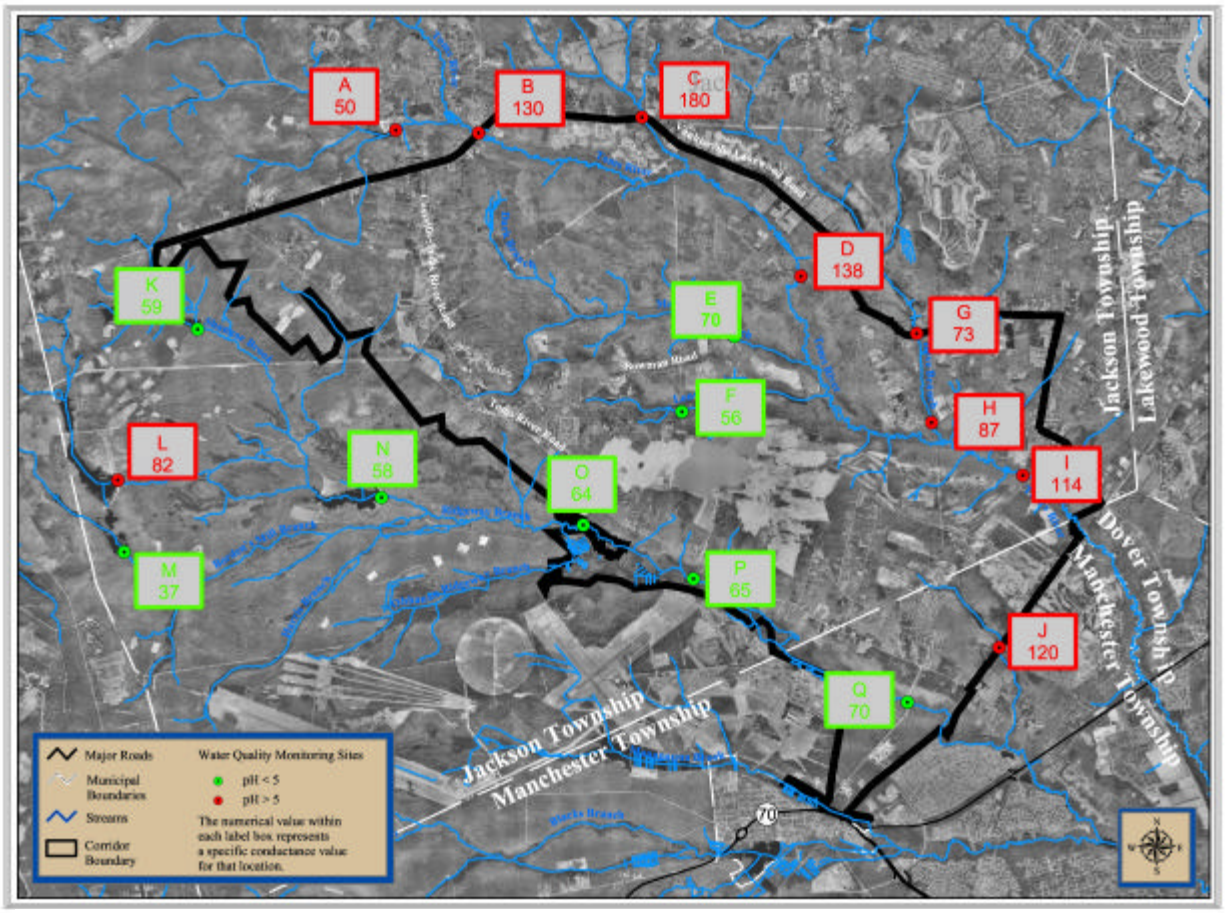

Figure 5. Pinelands Commission Surface Water Quality Monitoring Sites.

In contrast, with the exception of one headwater monitoring site, the Ridgeway Branch and its tributaries appear to display characteristics of minimally disturbed Pinelands water quality, which is approximately a pH value under 5.0 and specific conductance between 30-80 µS cm^{-1} (Zampella et al., 2003). This may be due to the location of these waters in forested areas within and near the Colliers Mills WMA. Data on nutrients and pesticides in surface water samples collected by the Pinelands Commission and the U.S. Geological Survey during 1987-97 (Hunchak-Kariouk and Nicholson, 2001) also reflect this contrast in water quality. Median nitrate-N, total nitrogen, and total phosphorus concentrations were all lower in samples collected from Maple Root Branch (at Bowman Road) and Ridgeway Branch (near Colliers Mills WMA) than those of samples collected from a site on the main stem of the Toms River (near Vanhiseville). Five stream sites in the Toms River watershed were sampled for 48 pesticides by the U.S. Geological Survey during 1998-2000, and no pesticides were detected in the sample from Maple Root Branch, while seven to twelve pesticide compounds were detected at low levels in samples collected at the other four sites (DeLuca et al., 1999, 2000a, 2000b). To maintain high water quality where it currently exists, the Task Force recommends minimizing the disturbance of the surrounding land.

b. Ground Water

Ground water in the Toms River Corridor plays a critical role in supporting the wetland and aquatic ecosystems and in providing water supply for human use. Ground water discharge to streams accounts for most of the streamflow throughout the region, and as a result, the quality and quantity of ground water can affect the quality and quantity of surface water. Recharge to the aquifer system occurs primarily through the infiltration of precipitation in upland areas. Recharge patterns can be disrupted if impervious surfaces associated with development result in an increase in runoff to streams that would otherwise infiltrate and recharge the aquifer system. Therefore, actions that lessen the extent of impervious cover might also provide protection for recharge sources.

Another activity that can affect ground water and its role in maintaining streamflow is ground water extraction. Consumptive ground water withdrawals in the Toms River watershed have been shown to affect stream base flows by decreasing the rate of ground water discharge to streams (Nicholson and Watt, 1997).

Although impacted directly by above-ground hydrological processes such as precipitation and runoff, water levels in Pinelands streams and wetlands are most dependent upon ground water. Data collected by NJDEP for the Toms River Corridor shows that many areas exhibit high rates of ground water recharge, in the range of 16 to 20 inches per year (New Jersey Geological Survey). The regions of highest ground water recharge, with levels of 18-20 in/yr, are located in Manchester Township, most notably within the Stavola/Clayton mining tract.

Recharge areas in the 16-17 in/yr range are scattered throughout the Corridor. At least four such areas are large enough to merit individual mention. One is associated with the Pine Barrens Golf Course and extends into the Jackson portion of the Stavola/Clayton

tract. A large portion of the golf course property is preserved through a conservation easement. Another area is found along the north bank of the Toms River in Jackson's Regional Growth Area, where at least two large development projects are currently pending. A third significant recharge area is located to the west in Jackson's Forest Area, spanning properties largely protected through deed restriction. Finally, a large recharge area bridges the gap between Colliers Mills WMA and Cassville Village, encompassing properties currently protected, developed, and pending development.

In addition to ground water quantity, scattered data concerning ground water quality are available. NJDEP catalogues sites known to be sources of contaminants, about a half dozen of which fall within the Corridor, with more located around its fringes. These sites pose a potential threat to the area's water resources. All of them are located near areas of development, with most located in the three Villages.

Ground water in the underlying Kirkwood-Cohansey aquifer system is highly susceptible to contamination from human activities. The aquifer system is unconfined and highly permeable. The ground water is weakly buffered and the overlying soils in upland recharge areas typically are sandy, well drained, and have low cation-exchange capacities. Consequently, there is a potential for contaminants released at the land surface to become mobilized, enter the aquifer system, and migrate with ground water to wetlands, streams, and supply wells.

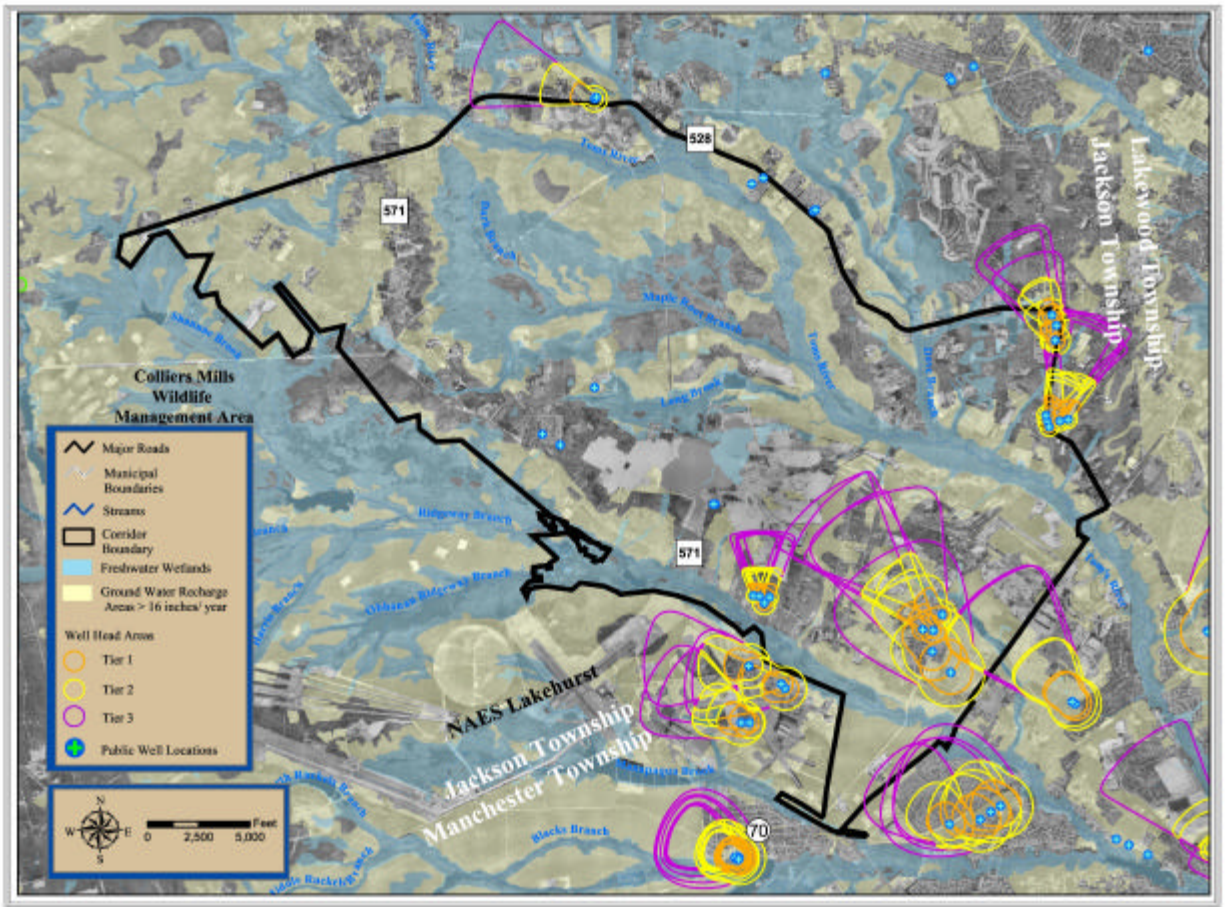

Figure 6. Ground Water Recharge and Well-head Protection Areas.

NJDEP also maps well-head protection zones to safeguard public water supplies. Most of the wells within the Corridor are located in Manchester's Regional Growth Area, with a few on the Lakehurst base and in Jackson's Rural Development Area (Figure 6). Their protection zones, as well as those of additional wells located outside the study area, overlay much of the extreme eastern portion of the Corridor.

3. Threatened and Endangered Species

The Corridor is known to be home to the **northern pine snake** (*Pituophis melanoleucus*), a species listed as "threatened" by the State of New Jersey Endangered and Nongame Species Conservation Act (N.J.S.A. 23:2A) and afforded protection under the Pinelands CMP (N.J.A.C. 7:50-6.33). Potential conflicts between areas designated for growth and known pine snake habitat became apparent through development applications submitted to the Commission. The Pinelands Commission requires site-specific surveys for threatened and endangered species for most development applications. While the surveys are often focused on a particular species such as the pine snake, they also collect information on the occurrence of other threatened and endangered plants and animals.

In addition to data compiled by the Commission, the Task Force examined the DEP's Landscape Project maps and data collected by NJDEP's Natural Heritage Program. This program maintains a database that tracks sightings of more than 1,000 species of plant and animals and more than 50 natural communities that are exemplary, rare, or imperiled at the state or global level. It includes officially listed endangered species from the Federal Endangered Species Act, the State Endangered Species Act, the State Endangered Plant Species List Act, the State Endangered and Nongame Species Conservation Act, and additional rare species that have not been listed officially. The Database is continuously updated and is the state's most comprehensive, centralized source of information on plants, animals, and natural communities. Collectively, these sources indicate that the Corridor is home to a number of threatened and endangered animal and plant species.

This information available to the Task Force was the result of site surveys driven by the permit process and from chance observations. A directed, systematic survey of the Corridor was not performed, nor was a detailed habitat assessment (e.g. vegetation structure, composition, etc. on specific sites). As such, the areas most intensively surveyed are those that have experienced the greatest development pressure. This may result in gaps of understanding the actual distribution of the T&E populations. Assessment of the habitat suitability that has guided the designation of conservation areas in this plan was based on the site-specific data, coupled with a broad, comprehensive assessment of landscape scale variables (e.g. size, connectedness, roads, isolation, forest cover, wetland systems, etc.).

a. Animals

The results of project-specific surveys submitted to the Pinelands Commission indicate that the **northern pine snake** (*Pituophis melanoleucus*), which is listed as a threatened species by the State of New Jersey, has a strong presence in the Corridor. The DEP's

Landscape Project maps, which overlays endangered and threatened wildlife species occurrence data with a patch-based map of land cover, shows that virtually every patch of forest within the corridor study area is valued for northern pine snake.

In addition to the pine snake, the presence of other threatened and endangered animals have been reported in surveys submitted to the Commission for sites in the Corridor. Sightings of several of these species have also been confirmed by the Natural Heritage Program. These species include:

- **Timber rattlesnake** (*Crotalus horridus*) is listed as "endangered" by the State of New Jersey. The rattlesnakes were found along the Ridgeway Branch in Manchester Township.
- **Pine Barrens tree frog** (*Hyla andersonii*) is listed as "threatened" by the State of New Jersey. The tree frog has been recorded within the Toms River/Maple Root Branch wetlands system.
- **Barred owl** (*Strix varia*) is listed as "threatened" by the State of New Jersey. It has been sighted in the forested wetlands along the Toms River.
- **Cooper's hawk** (*Accipiter cooperii*) is listed as "threatened" by the State of New Jersey. It has been sighted in the forested wetlands along the Toms River.

Based on the Natural Heritage Database and surveys received by the Pinelands Commission, the following animal species are known to exist in the adjacent area of Naval Air Engineering Station Lakehurst:

- **Bog turtle** (*Clemmys muhlenbergii*), listed as "endangered" by the State of New Jersey and is listed as "threatened" federally.
- **Corn snake** (*Elaphe guttata*), listed as "endangered" by the State of New Jersey.
- **Grasshopper sparrow** (*Ammodramus savannarum*), listed as "threatened" by the State of New Jersey.
- **Vesper sparrow** (*Pooecetes gramineus*), listed as "endangered" by the State of New Jersey.
- **Upland sandpiper** (*Batramia longicauda*), listed as "endangered" by the State of New Jersey.
- **Pine Barrens treefrog** (*Hyla andersonii*).
- **Northern pine snake** (*Pituophis melanoleucus*).

The Natural Heritage Database also indicates that the following animal species inhabit the Colliers Mills Wildlife Management Area:

- **Red-shouldered hawk** (*Buteo lineatus*), listed as "endangered" for breeding, or "threatened" for nonbreeding by the State of New Jersey.
- **Barred owl** (*Strix varia*).
- **Northern pine snake** (*Pituophis melanoleucus*).

b. Plants

Surveys received by the Pinelands Commission indicate that the following threatened and endangered plant species exist in the Toms River Corridor:

?? **Sickle-leaved golden-aster** (*Pityopsis falcata)* This species inhabits dry, open, sandy areas such as roadsides and mining sites.

?? **Southern twayblade** (*Listera australis*) is found in the Atlantic White Cedar stands that dot the wetlands portion of the forested complex south of the Toms River in Jackson Township.

?? **Barratt's sedge** (*Carex barrattii*) Remaining populations of this plant are found in the Pine Barrens in wetland areas with open sun and acidic soils (pH less than 5). (Sharp, 2001; Denemore, 1987; cited in Center for Plant Conservation)

?? **Pine Barrens boneset** (*Eupatorium resinosum*) is found in wetland areas and grows best in areas such as sphagnum and shrub bogs, seepage bogs, beaver ponds, pond shores, stream head pocosins and shrub swamps (Godfrey & Wooten, 1981; Mowbray, 1984; Weakley, 1991; cited in Center for Plant Conservation).

?? **Swamp pink** (*Helonias bullata*) Swamp pink, listed as "threatened" federally, requires wetland habitat, which is saturated but not flooded with water. It is found in Atlantic white-cedar swamps or swampy, forested wetlands which border small streams, meadows, and spring seepage areas (Center for Plant Conservation).

?? **Two-flower bladderwort** (*Utricularia biflora lentibulariaceae*), listed as "endangered" by the State of New Jersey.

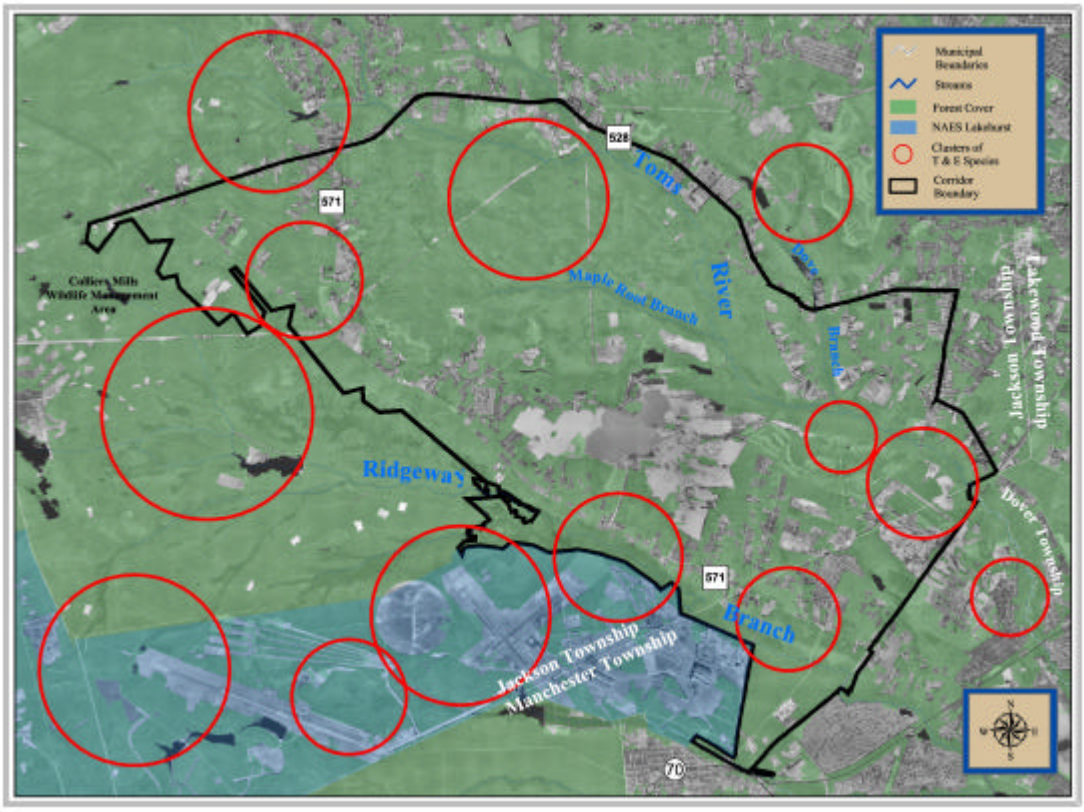

Figure 7. Known Threatened and Endangered Species Sighting Areas and Forest Cover.

Due to the occurrences of the individual species noted above, the Natural Heritage Program has designated two Priority Sites in the area that warrant special consideration due to their assemblages of endangered plant species. One is within Colliers Mills WMA and the other is in the Cassville area. Among the T&E species of plants documented in these areas are Barratt's sedge, Pine Barrens boneset, two-flower bladderwort, and swamp pink. All of these species are associated with wetlands habitats.

Figure 7 depicts the general location of the areas within the Corridor that exhibit the highest concentrations of a variety of T&E species sightings. While there are scattered sightings outside these areas, it is clear that the areas with the highest concentration of sightings coincide with the large, forested portions of the Corridor, which, furthermore, are also classified by DEP's Landscape Project as suitable habitat for T&E species.

III. FINDINGS AND PLANNING PRINCIPLES

A. Findings

1. Development Pressures Exist and Are Growing

Certain locations in the Toms River Corridor are experiencing development pressure, and additional areas will face the same pressures in the near future. As stated previously, approximately 1,500 residential units have been proposed for construction within the Corridor, with more expected under current zoning plans. While much of this development has occurred in areas designated for growth (Pinelands Villages and Regional Growth Areas), continued sightings of T&E species call into question whether these designations are appropriate in all cases. Furthermore, although less intensive development is permitted in more ecologically sensitive areas such as Forest Areas and transitional areas such as Rural Development Areas, some current development patterns do affect land, water, and biological resources. More development also typically leads to more roads, resulting in increased habitat fragmentation and potential for road mortality of wildlife. In addition to residential development, other types of development continue to locate and expand in the Corridor, most notably mining operations.

2. Water Resources Are Threatened

Water resources in the Toms River Corridor are generally abundant and high quality but face a number of threats, including nonpoint source pollution associated with run-off from an increased amount of impervious surfaces in developed areas. Several of the large residential projects currently proposed within the Corridor are located at least partially in areas of high ground water recharge. The largest proposed residential developments are located in close proximity to the main stem of the Toms River, the Ridgeway Branch, or their tributaries.

Additionally, development outside the Pinelands and the Toms River Corridor threatens both water quality and water supply, due to the consumptive use of water by interbasin transfer of

wastewater. Likewise, within the Pinelands Regional Growth Areas, consumptive interbasin transfer of wastewater may deplete water resources.

3. Threatened and Endangered Species Sighting Clusters Exist Within and Around the Corridor

Based on T&E species data obtained from the Natural Heritage Database, the Pinelands Commission, and the NJDEP's Landscape Project, it was determined that some areas of the Corridor contain a higher number and/or variety of individual species sightings in large, relatively undisturbed landscapes. In this report, these geographic areas containing clusters of T&E species sightings are referred to as "T&E nodes" (in order to distinguish these nodes from the definition of "node" as a focus of residential, commercial and service development, used in the Coastal Zone Management Rules (N.J.A.C. 7:7E)). The vacant land linking these T&E nodes is described as biological "connectors." The highest concentration of T&E species sightings within the Toms River Corridor is found in the following three T&E nodes (Figure 8):

T&E Node A - the Colliers Mills WMA/Naval Air Engineering Station Lakehurst
T&E Node B - the Maple Root Branch of the Toms River
T&E Node C - the Stavola/Clayton Mine/Pine Barrens Golf Course

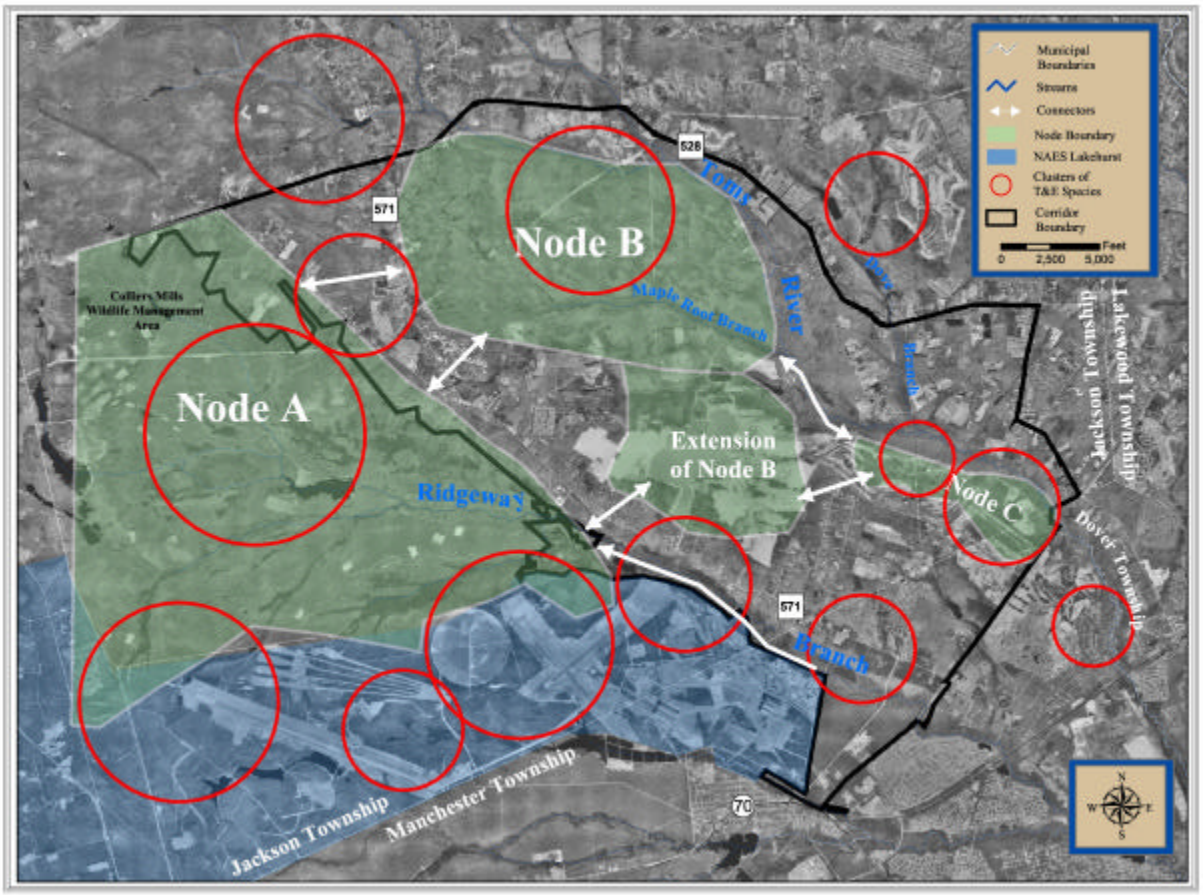

Figure 8. T&E Nodes (Highest Concentrations of Threatened and Endangered Species Sightings) and Connectors.

The location of these T&E nodes with respect to existing and future development as well as important water resources indicates where protective measures are most needed. A key objective for the protection plan is ensuring that these T&E nodes are sufficiently protected in terms of size and quality, as described in the following recommendations.

B. Planning Principles

1. Principles of Threatened and Endangered Species Habitat Planning

Based upon discussions with technical experts advising the Task Force and a review of the scientific literature, the following basic principles (Noss et al., 1997) for species habitat conservation were incorporated into the planning recommendations:

- ?? Species well-distributed across their native range are less susceptible to extinction than species confined to small portions of their range.
- ?? Large blocks of habitat, containing large populations, are better than small blocks with small populations.
- ?? Blocks of habitat close together are better than blocks far apart.
- ?? Habitat in contiguous blocks is better than fragmented habitat.
- ?? Interconnected blocks of habitat are better than isolated blocks.
- ?? Blocks of habitat that are roadless or otherwise inaccessible to humans are better than roaded and accessible habitat blocks.

a. Protecting Threatened and Endangered Species Habitat Nodes

Establishing a system of viable habitat T&E nodes and connectors is the most effective way to preserve populations of T&E species and other motile species where existing development has already fragmented large areas of undisturbed land. The T&E nodes should provide necessary home range for nesting, foraging and other life cycle activities while the connectors should allow for seasonal migrations and critical genetic flow between sub-populations.

The eventual cessation of mining activities on the Stavola/Clayton tract (T&E Node C) provides an example of how to plan for a valuable location of future habitat and expansion of habitat T&E nodes. Pine snakes and the sickle-leaved golden-aster have been found on the tract, indicating that suitable habitat for these species already exists. While ongoing mining activity limits current options for protection, the size of the tract (more than 600 acres) and its location with respect to the T&E nodes identified previously suggest that it should be addressed by current planning efforts. Similarly, if mining ceases on the larger Clayton tract to the west, it could extend the geographic area of T&E Node B.

The goal should be to maintain sufficiently large, intact and well-connected habitat patches that would support the most area-sensitive species of greatest environmental concern (Noss et al., 1997).

b. Establishing Threatened and Endangered Species Habitat Connectors

Establishing connectors between the T&E nodes is another priority for protection. As shown on Figure 8, connectors can be established between T&E Node A and T&E Node B, and between T&E Node B and T&E Node C.

The cornerstone of the biological connector concept is that regional populations require a certain level of interbreeding to ensure that the smaller subpopulations do not become genetically stagnant (Ralls et al., 1988). Genetic variation within a population of any species is highly beneficial for a number of reasons. In an evolutionary sense, a deeper gene pool provides more opportunity for variations to arise that will better equip certain individuals to adapt to changes in the environment, which might otherwise threaten the survival of the group. The different characteristics produced by interbreeding of subpopulations will often produce individuals better able to capitalize on existing resources. On a shorter time scale, genetic variation within a population reduces the risk of extirpation from disease.

A recent study in Conservation Biology (Beier and Noss, 1998) surveyed the existing literature on the establishment of biological connectors. This paper found published connector studies that offered evidence that corridors provide sufficient connectivity to improve the viability of populations in habitats connected by corridors. An earlier paper exploring the utility of connectors between larger habitat ranges cited a number of benefits bestowed by connectors on local populations, including: (1) a lower extinction rate in the sense of the equilibrium theory, (2) lessened demographic stochasticity, (3) avoidance of inbreeding depression, and (4) fulfillment of an inherent need for movement (Simberloff et al., 1992).

Two types of connectors are discussed in this report. The first would be created through establishment of an additional uplands buffer around the wetlands corridor in order to provide a passageway of relatively uniform width to provide for the T&E species found there. The other would be formed through various land protection techniques, including acquisition, clustering, and deed restriction. Both types of connectors should be pursued in order to prevent habitat "bottlenecks" from occurring that reduce the flow of individuals, and thus genetic material, between populations.

2. Water Resources

In applying the above planning principles that are directed at T&E species habitat conservation, water resources may be protected as well. Wetlands stream buffers for T&E habitat protection may also be effective in protecting water quality (Castelle et al., 1994). Protection of upland T&E habitats that are important recharge areas may also help to protect both the quality (due to point and nonpoint source pollution) and quantity (due to minimization of impervious surfaces) of recharge. Strategies to protect T&E habitats that result in minimizing the percentage of developed land may also result in water quality

protection, as implied by results of studies relating water quality to land-use gradients (Zampella, 1994; Hunchack-Kariouk and Nicholson, 2001.)

Water recharge areas, wetlands, and surface water quality will be better protected through planning efforts to sustain areas of water recharge, minimize interbasin transfer of wastewater, minimize impervious surfaces, and, where practical, utilize wastewater treatment systems.

Given these findings, the following strategic plan represents the Task Force's recommendations for preserving the region's natural resources.

IV. STRATEGIC PLAN

Based on the known presence of T&E species and other critical natural resources, existing development patterns and anticipated trends, the Task Force makes the following recommendations in an attempt to achieve the Ecological Goals and Land Use and Development Goals described in Section I.D.

Protecting existing T&E nodes of important habitat and establishing connectors between the T&E nodes, protecting surface water, groundwater, and recharge areas are fundamental objectives of the protection plan for the Toms River Corridor. To achieve these objectives the Task Force recommends that a variety of complementary measures be undertaken. While no individual action is sufficient to ensure the protection of the resources found in the Corridor, collectively, they work to reduce the potential for conflicts with development that have been occurring with increasing frequency in recent years.

A coordinated effort among state and local government agencies, non-profit organizations, and other interested parties will be necessary to implement regulatory and non-regulatory measures in an attempt to achieve the Task Force's recommended goals. The tools selected for use in the Corridor are detailed in the following section. The recommendations that follow are classified as either short-term (i.e., no amendment to the Pinelands CMP is required and/or would generally take less than one year to implement) or long-term (i.e., a CMP amendment or an unknown amount of research is required and/or would take longer than one year to implement).

A. Short-term

1. Changes in Municipal Zoning and Pinelands Management Area Designations

Changes in Municipal Zoning Densities and Designations

Through zoning, municipalities direct the pattern and intensity of development within their communities, permit agriculture, commercial, and industrial uses in appropriate locations, and preserve open space. In the Pinelands Area, municipalities are required to adopt zoning plans which conform to and implement the Pinelands CMP, both in terms of zoning or management area boundaries and permitted intensities of development.

Changes to Pinelands Management Area Designations

Within certain limits, the CMP provides municipalities with the ability to adjust management area boundaries without the need for the Commission's adoption of a formal amendment to the CMP. Such management area changes typically can be reviewed and certified by the Commission within a few months, allowing them to take effect much more quickly than would otherwise be the case.

A subcommittee of the Task Force evaluated existing zoning and management area boundaries in the Corridor and made the following recommendations to more effectively protect forested landscapes, habitat for threatened and endangered species and important water resources, while concentrating future development in areas that are already disturbed. In brief, the proposed changes involve:

- Reducing the size of three Pinelands Villages (PV) in Jackson,
- Creating a new zone blending two management areas on the boundary between Jackson and Manchester,
- Creating a new Forest Area (FA) zone in Jackson,
- Redesignating land in Jackson from Rural Development Area (RDA) to Forest Area (FA), and from Regional Growth Area (RGA) to Rural Development Area,
- Implementing mandatory clustering in various Forest, Rural Development, and Regional Growth Area zones in Jackson and Manchester,
- Implementing mandatory restrictions on lot clearing,
- Changing zoning to better reflect existing land uses in Jackson and Manchester's Regional Growth Areas.

The following maps (Figures 9 and 10) illustrate the current and proposed changes to zoning and management areas within the Corridor. They are followed by detailed descriptions of the expected benefits and steps required to implement each one.

a. Reduce the size of Pinelands Villages in Jackson Township

Pinelands Villages are defined in the CMP as small, existing, spatially discrete settlements which are appropriate for infill residential, commercial, and industrial development compatible with their existing character. A reduction in the size and residential development potential of Pinelands Villages will achieve important conservation benefits. Lower intensities of residential and commercial development place fewer demands on the area's natural resources. Less construction means a lower percentage of impervious surfaces, which has positive implications for water quality and quantity within the region's watersheds. The burden on ground water supplies as well as the environmental risks associated with wastewater treatment will increase less dramatically. Smaller development zones and fewer houses will necessitate less clearing of forested lands, which will provide more contiguity of habitat for Pinelands plant and animal species. In addition, the lower level of vehicular traffic will pose less of a threat to species moving from one population center to another.

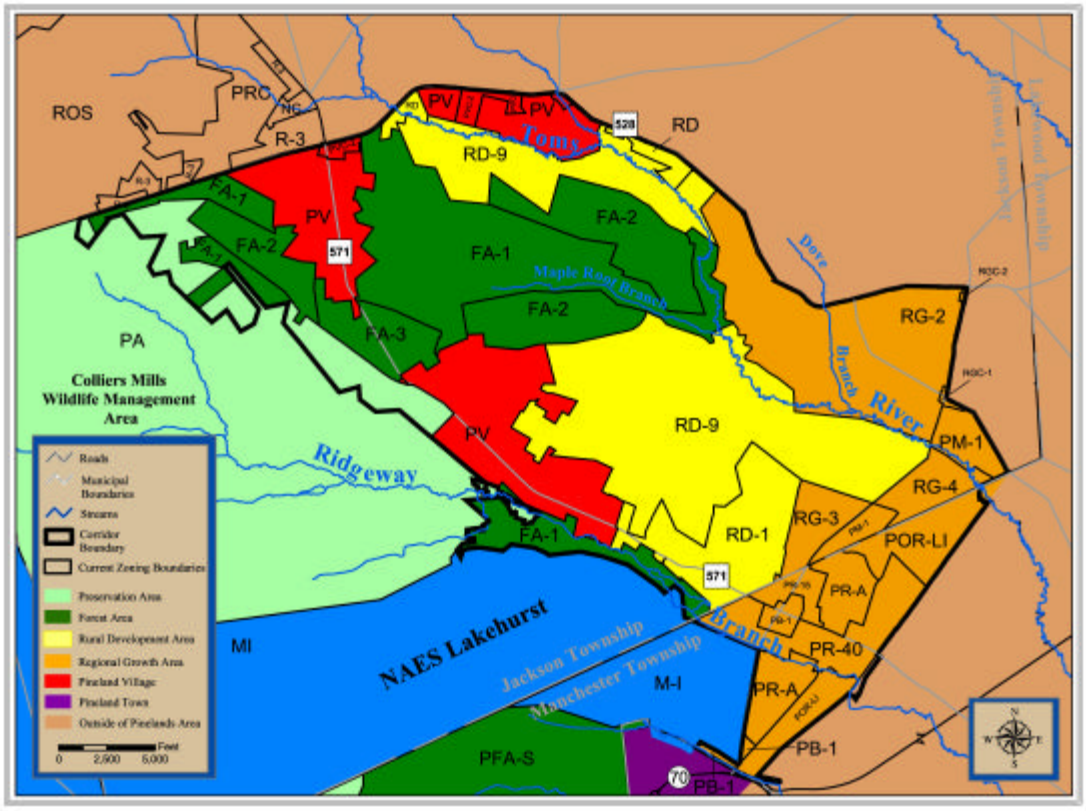

Figure 9. Existing Municipal Zoning and Pinelands Management Area Boundaries.

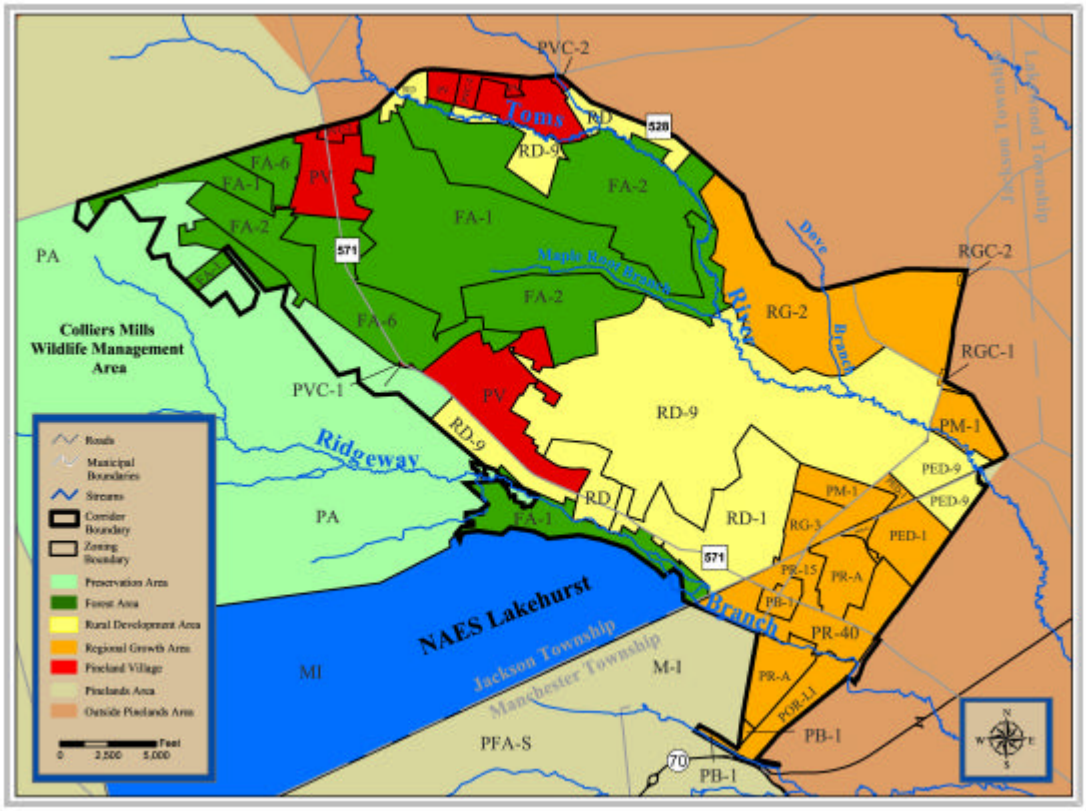

Figure 10. Proposed Changes to Municipal Zoning and Pinelands Management Area Boundaries.

Jackson Township should rezone portions of Cassville, Legler, and Vanhiseville Villages to the surrounding Forest or Rural Development Areas (Figure 11). Currently, all areas within the villages are zoned for one-acre development. Permitted densities for the areas removed from the village zones would decrease to either one dwelling unit per 3.8 acres (1du/3.8ac), 1du/6ac, or 1du/9ac. In designing the village rezonings, the focus was on those portions of the villages that are least densely developed, undeveloped, or in public holding. Contiguity with existing Forest or Rural Development Area was also an important factor in constructing the new zoning pattern. Once adopted by Jackson Township, the Pinelands Commission should certify these rezonings to Forest Area and Rural Development Area, as appropriate.

CASSVILLE

Two areas currently within the Pinelands Village of Cassville should be rezoned to the Forest Area and placed in a newly created FA-6 (1du/6ac) zone. Involving slightly over 400 acres, these Cassville rezonings are aimed at establishing a biological connector between Colliers Mills WMA and a large forested area east of Cassville. Pinelands Commission surveys have identified pine snake habitat within the proposed rezoning areas. By rezoning the areas to a lower density district with requirements for cluster development, the preservation of larger areas of forested habitat will be feasible.

In total, the Pinelands Village of Cassville will be reduced in size from 786 to 384 acres. The existing village zone density of 1du/ac will remain.

LEGLER

Legler should undergo the most complex alterations, as portions of the Village should be redesignated as FA-6, RD-9, and RD. A strip of properties totaling 118 acres along the Village's northwestern edge should be added to the adjacent FA-6 zone (1du/6ac). The portion of the Village south of Cassville-Toms River Road should be moved into the RD-9 (1du/9ac) Rural Development Area, along with small sections to the north that currently extend into the existing RD-9 zone. In all, about 283 acres should be redesignated from Village to the RD-9 zone. The third change to Legler should involve the redesignation of 205 acres as RD with 1du/3.8ac zoning, which would introduce a third Rural Development Area into the Legler-Clayton corridor (the RD zone already is in use elsewhere in the municipality).

The Forest Area addition should help to maintain contiguous habitat and increase the viability of the biological connectors in between T&E nodes of habitats. Additions to the Rural Development Area on the eastern and southern borders of the Village will play a large role in preservation of a biological connector near Legler, between T&E Node A (the Colliers Mills WMA/Naval Air Engineering Station Lakehurst area) and the centrally located Clayton mining tract. The new RD-9 zone along the south side of Cassville-Toms River Road lies close to the Ridgeway Branch, and the reduction in density will aid in the protection of that corridor.

In total, Legler Village will be reduced in size from 1,180 acres to 575 acres. The existing village zone density of 1du/acre will remain.

VANHISEVILLE

Approximately 75 acres of Vanhiseville Village should be placed in the RD zone (1du/3.8ac). This will join the far eastern and western portions of the Village with the existing Rural Development Areas. To the east of Vanhiseville, the expanded RD zone will better protect the water resources associated with the north fork of the Toms River, which drains the area north of the Village just upstream of the main stem.

Once rezoned, Vanhiseville Village will total 435 acres. The existing village zone density of 1du/ac will remain.

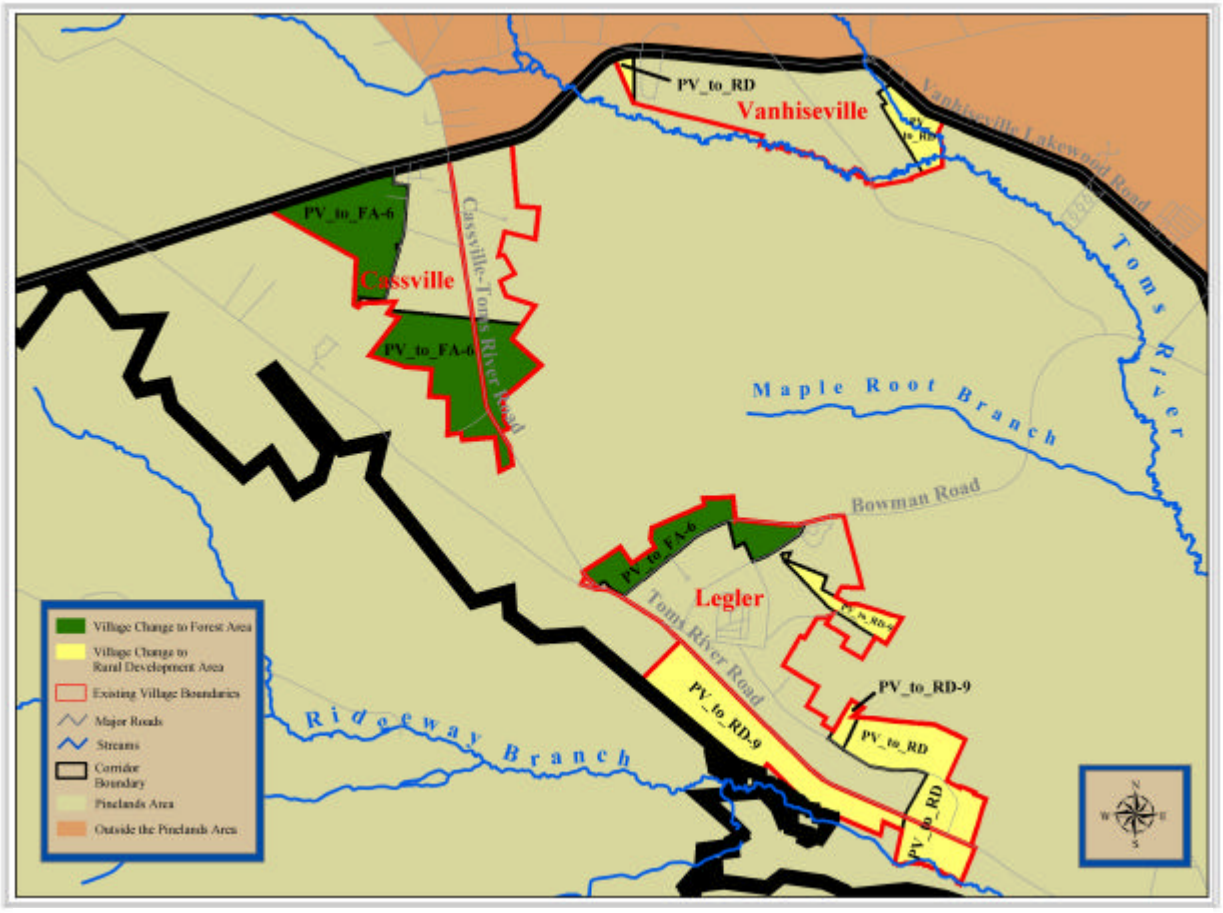

Figure 11. Proposed Changes to Pinelands Village Boundaries.

b. Create a new zone that blends two Pinelands Management Areas in Jackson and Manchester Townships: the Planned Environmental Development Zone

Both Jackson and Manchester Townships should create a new Planned Environmental Development (PED) Zone in order to direct development away from environmentally sensitive land by encouraging the use of sewered, clustered development in an on-site "receiving area".

The total area of the PED zone is 615 acres, encompasses four Stavola and one Clayton properties, and lies in both municipalities (Figure 12). This Stavola/Clayton tract is recognized as an important population center for pine snakes and is also known to harbor colonies of at least one listed plant species. This innovative approach to zoning and land use planning will serve to maximize the protection of T&E species while still allowing development on less critical portions of the tract.

The upper (northeasterly most) two-thirds of the PED zone should be redesignated from Regional Growth (4du/1ac) to Rural Development with 1du/9 acre zoning in an effort to protect the populations of threatened and endangered species that have been found there. Clustering on one-acre lots should be mandatory within the PED-9 area with development sites determined by the location of critical habitat. The main objective within the PED-9 zone will be protection of the natural resources.

The lower one-third of the PED zone (PED-1) should remain as Regional Growth Area but at a reduced base residential density of one unit per 3.2 acres. Planned adult communities should also be permitted as a conditional use in the Regional Growth Area portion of the new zone, at a maximum density of 3 units per acre. Applicable conditions should include the mandatory clustering of all units which would otherwise be permitted in the Rural Development portion of the zone into the Regional Growth portion, the subsequent deed restriction of all lands in the Rural Development portion of the zone to preclude any future development, the use of Pinelands Development Credits (PDCs) and the provision of sewer service. (Note: sewer connections should be permitted through the Rural Development Area, if deemed necessary.)

The creation of the PED zone recognizes the conservation and development goals, which, in this instance, cross political boundaries. The existing zoning on the Jackson side of the Stavola/Clayton tracts is high density residential (a density of up to 6 units per acre is permitted). On the Manchester side, a portion of the area is currently included in a nonresidential zone, which allows a variety of office, research, and light industrial uses and another portion is included in a residential zone (a density of up to 1.5 units per acre is permitted). The PED zone will create uniformity in zoning across municipalities, a solution also dictated by the unique characteristics of the mining site. Also, the proposed division of the PED zone will unite similar land cover and uses; the upper conservation area with protected lands on the golf course property and along the Toms River, and the lower growth area with areas of existing residential development in Manchester.

Both sections of the PED zone, 1du/9 acre RDA and 1du/3.2 acre RGA – need to be implemented in Jackson and Manchester Townships. The townships should adopt identical ordinances to ensure consistency across the entirety of the PED zone.

Pinelands Commission staff will draft an ordinance to assist the two municipalities in implementing the new zone.

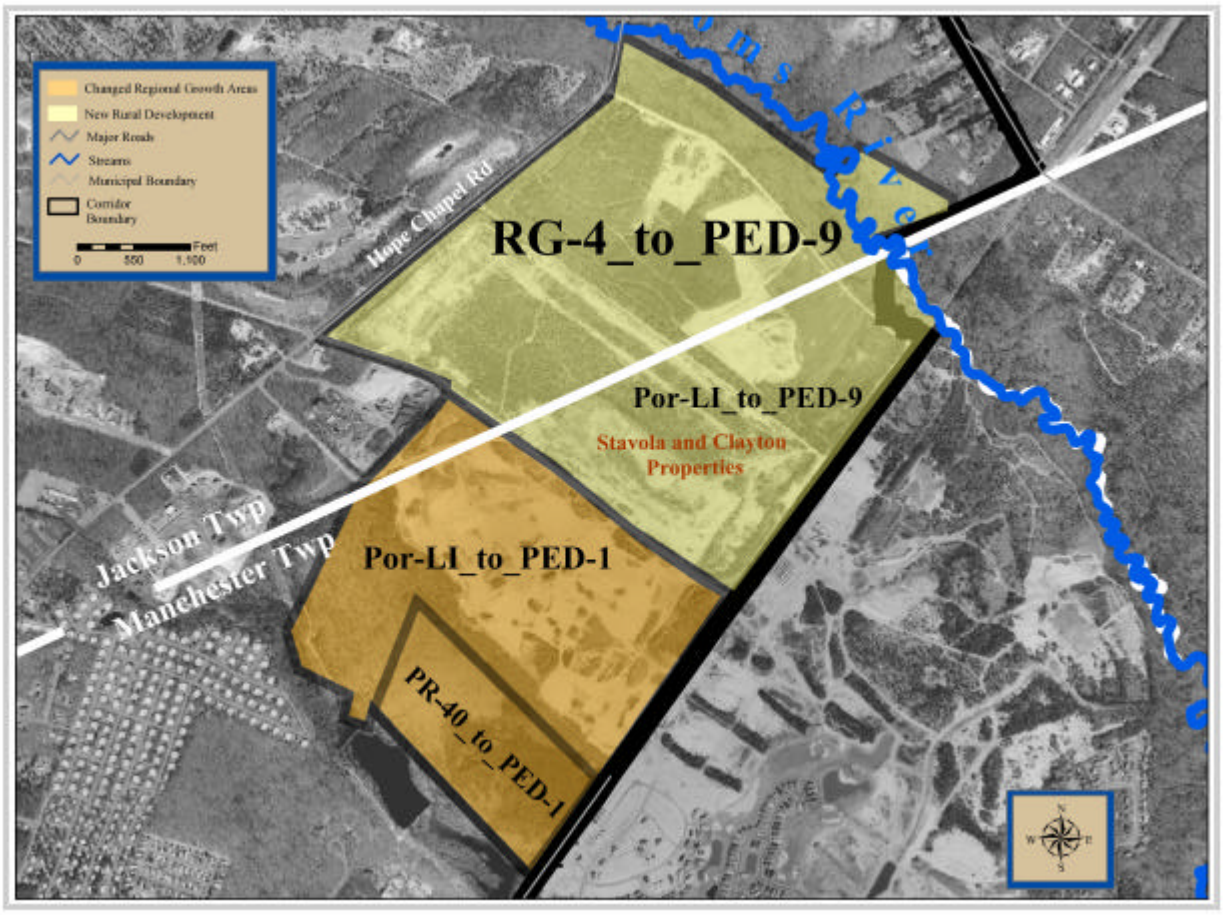

Figure 12. Proposed Changes Associated with the Planned Environmental Development (PED) Zone.

c. <u>Redesignate land from Regional Growth Area to Rural Development Area in Jackson Township</u>

A portion of Jackson's RG-2 (2du/ac) zone should be redesignated as RD-9 (1du/9ac) with all the provisions associated with that zoning (Figure 13). The area in question is located along the north bank of the Toms River and covers about 367 acres, much of it wetlands (approximately 42 percent). This area is comprised mainly of medium-sized vacant and agricultural lots, with little existing residential development impacted and few nonconforming lots created. The new RD-9 zone is bordered by more dense development north of Grawtown Road and the PM-1 (Pinelands Manufacturing) zone to

the east. A small commercially developed property at the intersection of Hope Chapel and Vanhiseville-Whitesville Roads should be excluded from the rezoning and remain in the RGA.

The change from Regional Growth Area to Regional Development Area will provide consistency in zoning across both sides of the Toms River and will provide buffering along a critical stretch of the waterway as it leaves the conservation area in the northwest. Preserving land in this area will provide a more expansive area in the vicinity of T&E Node C (the Stavola/Clayton tract and Pine Barrens Golf Course). Agricultural activities will continue to be encouraged within the RD-9 zone, but residential construction will be curtailed in this sensitive area.

d. Change zoning within the existing Regional Growth Areas in Jackson and Manchester Townships

Jackson Township should rezone a portion of its RG-3 zone (2.5du/1ac) as PM-1 to better reflect the non-residential nature of the development that has occurred there (Figure 13). Approximately 115 acres should be taken out of the RG-3 zone, representing about 45% of the zone as currently configured. The changes within the RG-3 zone will have minimal implications for the Corridor's natural resources but do serve to make zoning more consistent with land use and in doing so facilitate the desired development activity within the Township.

Jackson Township also plans to implement a reduction in its Regional Growth Area residential zoning capacity in accordance with N.J.A.C. 7:50-5.28(a)7iii of the CMP. This provision of the CMP, adopted in December of 2001, provides certain Pinelands municipalities with the opportunity to reduce their Regional Growth Area density obligations to as low as 2.5 units per developable acre, provided certain conditions relative to the identification of infrastructure, utility service, recreation, conservation, economic development, housing and community development needs and the accommodation of PDCs are met. Jackson's current obligation is 3.0 units per developable acre; thus a 16 percent decrease is to be implemented. This would be accomplished through a reduction in permitted residential density in the RG-3 zone and the implementation of the PED zone described in section b. (above). Together with the reduced development potential realized through the rezoning of land from Regional Growth Area to Rural Development Area described in section c. (above), these zoning changes will reduce the residential zoning capacity of Jackson's Regional Growth Area from 6,225 to approximately 3,500 units. Opportunities for the use of PDCs will continue to be provided by the revised zoning plan. While the total number of such opportunities will be reduced, the likelihood of PDC use will actually be increased due to the lower base densities being established. For example, while PDCs were required only when densities exceeded 4 du/ac in Jackson's RG-4 zone, they will now be required in the 1-3 du/ac range in the new PED zone.

Manchester Township should also implement zoning changes to its Regional Growth Area within the Toms River study area, including a decrease in overall Regional Growth Area residential zoning capacity. In Manchester's case, a reduction from 3.5 units per developable acre to 2.5 units per developable acre could be implemented, representing a 30 percent decrease. Permitted densities for planned retirement communities in Manchester's PR-A (Pinelands Rural Agricultural, 1du/ac) zone could be decreased and, as in Jackson, the PED zone should be implemented. In Manchester's case, the PED zone is to be established primarily in an area currently zoned for nonresidential development. Therefore, while the overall density provided by the Township's revised zoning plan will be decreased, total residential zoning capacity in Manchester's Regional Growth Area will actually increase as a result of these zoning changes, from 1,855 to approximately 2,300 units. As is the case in Jackson, opportunities for the use of PDCs will continue to be provided and should be enhanced through the establishment of lower base densities.

An overall reduction in residential zoning capacity within the Regional Growth Area in the Corridor should result in lessened site-specific impacts and fewer demands being placed on the area's natural resources as there will be less clearing, impervious surface, traffic and nonpoint source pollution associated with the reduced intensity of residential development.

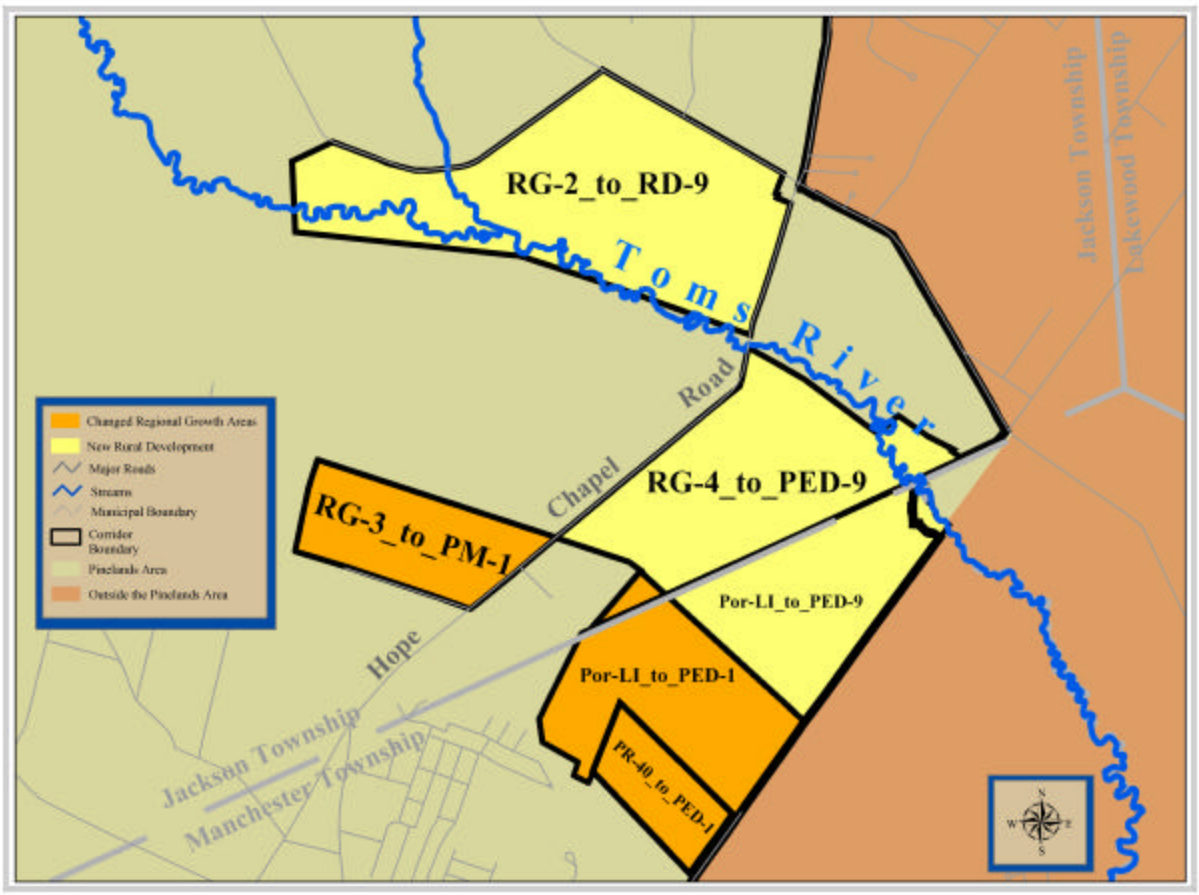

Figure 13. Proposed Changes to the Regional Growth Zones.

e. Create a new Forest Area zone in Jackson Township

A new FA-6 (1du/6ac) zone should replace the existing FA-3 (1du/3.2 acre) zone in Jackson Township and should also be expanded to include the areas removed from Cassville and Legler villages that were discussed above (Figure 14). The FA -6 zone will total approximately 900 acres and will serve as a bridge of forested land and lower intensity development between the two villages. In order to maximize the effectiveness of land preservation and municipal infrastructure within this zone, mandatory one-acre on-site clustering of residential development should be required and should include limits on lot clearing. Details on how building sites can be determined are provided in the section on clustering below.

The FA-6 zone will provide a heightened level of protection for the natural resources within areas currently zoned for 1du/ac or 1du/3.2-acre development. The new zone traverses areas of T&E species habitat, high ground water recharge, and forested Pinelands landscapes and also encompasses agricultural uses important to the diversity and stability of the Corridor's economic base. The protection afforded by the FA-6 zone will be the cornerstone of habitat viability within the Cassville biological connector. Mandatory clustering will ensure substantial wooded areas to increase the effectiveness of the connector (e.g., for every one acre of development disturbance, five acres will remain undisturbed). The decreased density associated with the new zone allows the Township's overall Forest Area zoning plan to remain consistent with CMP standards for Pinelands Forest Areas (municipalities may zone for a maximum of one unit per 15.8 acres of privately owned, vacant upland).

f. Redesignate land from Rural Development Area to Forest Area in Jackson Township

Large portions of Jackson Township's RD-9 zone (1du/9ac) are being recommended for redesignation as FA-2, to be zoned for one dwelling unit per 32 acres (1du/32 ac) (Figure 14). This would include most of the existing RD-9 zone south of the Toms River near Vanhiseville and also an area south of Bowman Road that abuts the Clayton properties and an Ocean County park. In total, approximately 850 acres are being proposed for this redesignation from Rural Development Area to Forest Area. Excluded from the new FA-2 zone is a 100+ acre area that has been approved for construction of 64 clustered one-acre units. In recognition of this development approval, this tract should remain in the RD-9 zone. The new FA-2 areas will be contiguous with existing FA-2 zones and should include provisions for mandatory clustering of residential development.

It is important to note that this proposed management area redesignation would better reflect the underlying characteristics of the landscape. The new FA-2 areas are almost completely forested and a sizeable portion (262 acres or 30 percent) is comprised of wetlands. Approximately 180 acres of the area being recommended for redesignation are currently under State ownership and an additional 500 acres were recently deed restricted in connection with the approved residential cluster development project mentioned above. The two northern sections are forested and known to be important habitat for pine

snakes as well as a possible site for Pine Barrens tree frogs and other T&E species. Their location proximate to the Toms River makes these tracts especially important in terms of water resource protection. The new FA-2 area south of Bowman Road would help to establish a transitional protection zone between the larger forested areas and the Clayton tract.

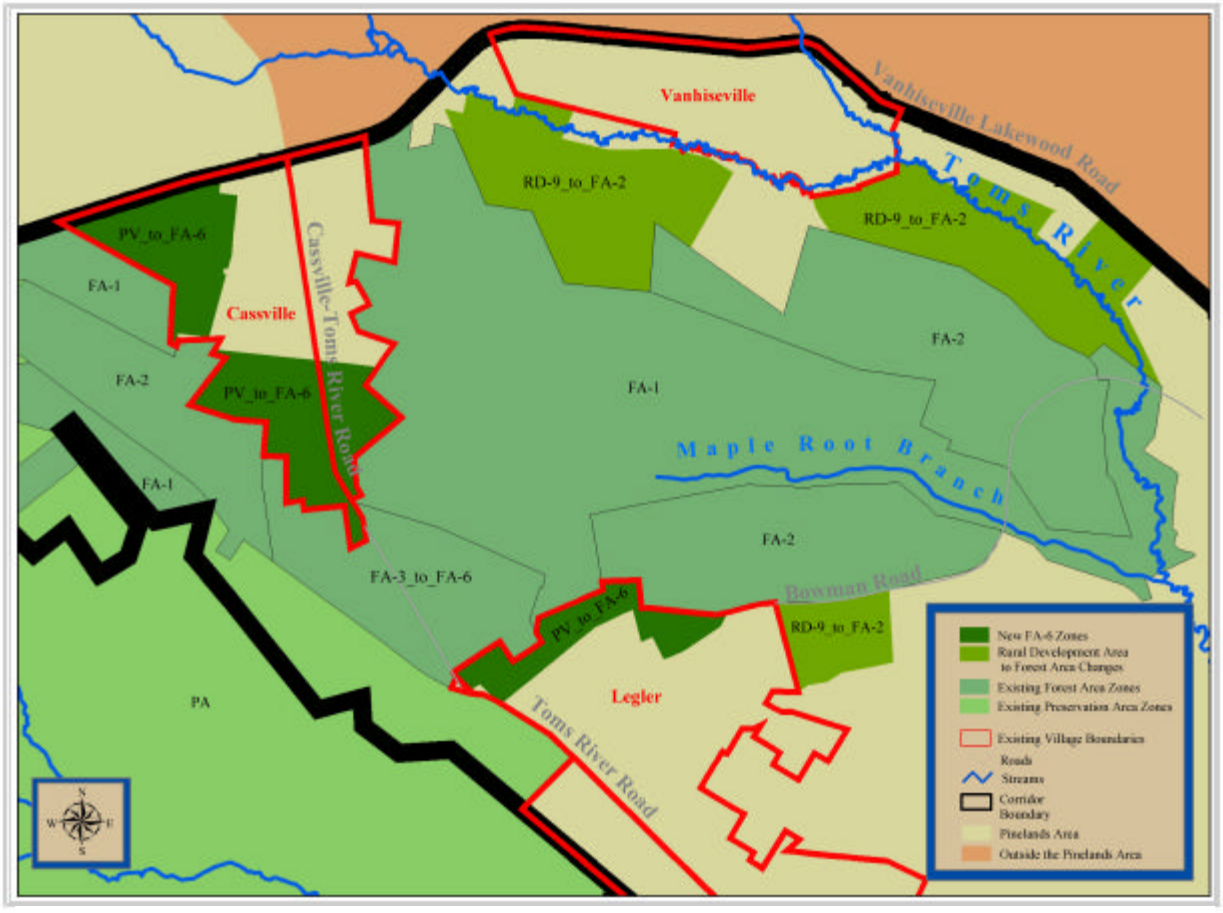

Figure 14. Proposed Changes in Forest Area Designations.

g. Change zoning within the Rural Development Area in Jackson Township

Jackson Township should make changes to its existing RD-9 zone (1du/9ac), which currently permits single-family residential development, agriculture, forestry, recreational facilities, resource extraction, and certain institutional uses. One such change could be the creation of a non-residential zone for the future of the Clayton mining site that would include a clustering provision for the commercial or industrial activities that remain or that could occur there after the cessation of mining, depending upon Township goals. Another would be a requirement for on-site clustering of residential development on one-acre lots (and/or commercial development) throughout the RD-9 zone where currently it is an optional feature. Clustering, coupled with restrictions on lot clearing, within the RD-9 zone could ensure that almost 90% of the land available for development will remain as open space.

The following table summarizes the proposed zoning changes described above.

Table 4. Summary of Proposed Zoning Changes.

Current			Proposed			Acres		Township
Zone	PMA	Density	Zone	PMA	Density	Total	Upland	
FA-3	FA	3.2	FA-6	FA	6	376	311	Jax
PV	PV	1	FA-6	FA	6	520	448	Jax
RD-9	RDA	9	FA-2	FA	32	846	584	Jax
PV	PV	1	RD	RDA	3.8	280	194	Jax
PV	PV	1	RD-9	RDA	9	283	216	Jax
RG-2	RGA	0.5	RD-9	RDA	9	367	214	Jax
RG-4	RGA	0.25	PED	RDA	9	385	343	Jax
PorLi	RGA	n/a	PED	RDA	9			Man
RG-4	RGA	0.25	PED	RGA	1	259	181	Jax
PR-40	RGA	1	PED	RGA	1			Man
PorLi	RGA	n/a	PED	RGA	1			Man
RG-3	RGA	0.4	PM-1	RGA	n/a	115	115	Jax

2. On-site Clustering Provisions

The central tenet of the Pinelands CMP is to concentrate development in the most appropriate areas while preserving land of higher ecological value in an undeveloped state. This principle can be applied within the Corridor through the use of clustering provisions. Where the construction of residential units is permitted in the Corridor, higher-density, clustered housing would be preferred because more area would be conserved in an undeveloped state (Noss et al., 1997). On-site clustering standards could be used to direct development in such a way as to minimize impacts on surrounding environmentally sensitive land while allowing for residential development.

The basic concept of clustering is that it directs development within the bounds of an individual property. The landowner is provided the opportunity to develop a permitted number of units on a property on reduced lot sizes, gathered in a particular area, while leaving the remainder of the property undisturbed. In some cases, a "development" area is specified or the maximum percentage of a property that may be developed is established in a municipal ordinance. The "conservation area" is chosen to best protect important habitat, water resources, or some other environmentally valuable attribute. Likewise, the location of development should be coordinated with development of other surrounding properties in order to achieve the highest contiguity of critical wildlife habitat and protection of water resources, the most efficient growth patterns, minimize roads and best use existing and planned infrastructure, and maximize the contiguity of preserved land to provide for habitat. Clustering development can also foster a sense of community through neighborhood development within the municipality.

The Toms River Corridor Plan calls for the strengthening of clustering provisions in a number of existing and newly created municipal zones in Jackson and Manchester Townships (Figure 16). Whereas certain zones currently offer the *option* to cluster residential development, under the proposed zoning plan at least five zones, located in both municipalities, will feature *mandatory* one-acre clustering of residential development: Jackson's new FA-6 zone, a transitional Forest Area between the villages of Cassville and Legler which extends the existing Forest Area to the banks of the Toms River; Jackson's RD-9 zone, which encompasses the Clayton properties as well as the new Rural Development Area on the north bank of the Toms River; Jackson's RD zone, located along the edges of Vanhiseville and Legler villages; and the PED zone, including the 1du/9ac Rural Development Area and 1du/3.2ac Regional Growth Areas in both Jackson and Manchester. The newly crafted clustering ordinances should include performance standards to ensure that the locations chosen for development are consistent with the goals and objectives of this plan as well as with the principles of sound municipal planning. In addition, the Task Force recommends that the FA-1 and FA-2 zones also include mandatory clustering provisions on 3.2-acre lots.

It should be noted that development in the Pinelands Forest Area on lots smaller than 3.2 acres in size is not something that the Pinelands Commission has frequently authorized in its certification of municipal land use ordinances. In this case, however, the Task Force believes it is warranted as a means of facilitating the permanent protection of large amounts of environmentally sensitive land in the Forest Area while at the same time allowing what is a relatively small amount of residential development to be clustered in the most appropriate areas, adjacent to existing development.

To further reduce habitat fragmentation and minimize harm to water resources, it is recommended that Jackson Township establish maximum permissible clearing limits for development of a dwelling unit and accessory uses within the Forest Area zones, RD-9 zone and RD-3.8 zone. Clearing should be defined as removal or alteration of any portion(s) of native plant communities at any structural layer. The main structural components include but are not limited to the following vertical layers (lowest to highest): organic soil layer, herbaceous vegetation, shrub, understory, and canopy. The structural complexity of native plant communities is critical to the health of T&E species and water resources. All elements of this structure provide critical food and cover for threatened and endangered wildlife (Beans and Niles, 2003). In addition, they play an essential role in the purification and recharge of water. Thus, removal of any of these layers could have negative impacts on T&E species and water resources, compromising the goals of the Pinelands Comprehensive Management Plan.

3. Conservation Easements

Easements allow landowners to retain possession of their land while sacrificing the right to some future usage, usually development, in return for monetary compensation or development privileges elsewhere. Conservation easements (as opposed to agricultural easements) are designed to preserve land in its natural, undisturbed state. When particular

resources are present, the language of the easement can be quite specific and the restrictions on uses fairly encompassing in order to ensure adequate protection. Two important aspects of a conservation easement are the establishment of a monitoring protocol (including a monitoring agent and time table) to make certain that the provisions of the easement are being followed and a mechanism for enforcement should those provisions be violated.

Conservation easements are a complement to clustering in order to preserve ecologically valuable land while allowing the landowner to retain certain rights and privileges. Opportunities exist for implementation of conservation easements in the Toms River Corridor. One possibility would be to include conservation easements in the on-site clustering initiatives to be implemented by the townships. Easements are also applicable in situations where development is not involved, as a means to retain ownership of a property while at the same time ensuring its permanent protection as wildlife habitat or the like. Finally, although farming is a limited land use within the Corridor, opportunities may exist for agricultural easements to be placed on land either by the county or state in order to allow for farming to continue, but prevent certain types of more intensive land uses in the future.

The Task Force recommends land protection using conservation easements as well as standardizing and strengthening the conservation easement document, so that all lands preserved in this fashion will receive an adequate level of natural resource and habitat protection as well as the appropriate monitoring and enforcement provisions (Figure 15). A draft conservation easement for use by governmental and nonprofit entities within the Corridor is presented in Appendix C.

Currently, at least three properties within the study area have or are expected to have deed restrictions placed on large portions of them due to the presence of T&E species. In each case, residential development has been approved elsewhere on the property. The largest of these involves the Diamond Developers, or Presidential Estates, a site that actually encompasses a number of parcels within the Forest and Rural Development Areas of Jackson Township. This area was referenced earlier as one that falls within a large forested area, and contains a 135-acre area set aside for development with the remainder of the holding, approximately 875 acres, having been deed restricted and either turned over to the Township for stewardship or retained by the landowners. Permanent protection of the Diamond Developers conservation area is a critical component of the overall preservation of the large forested area and provides the rationale for expanding the Forest Area in that part of Jackson Township. The Township should work with the state, New Jersey Conservation Foundation, and the Pinelands Commission to explore opportunities for strengthening the existing deed restrictions.

The two other properties that are expected to have deed restrictions placed on them soon are residential development projects, both located in the Cassville area. These developments should also provide an opportunity for the municipality to utilize the newly standardized and strengthened conservation easement. In all, nearly 1,000 acres of land can be more effectively permanently protected through implementation of better easements.

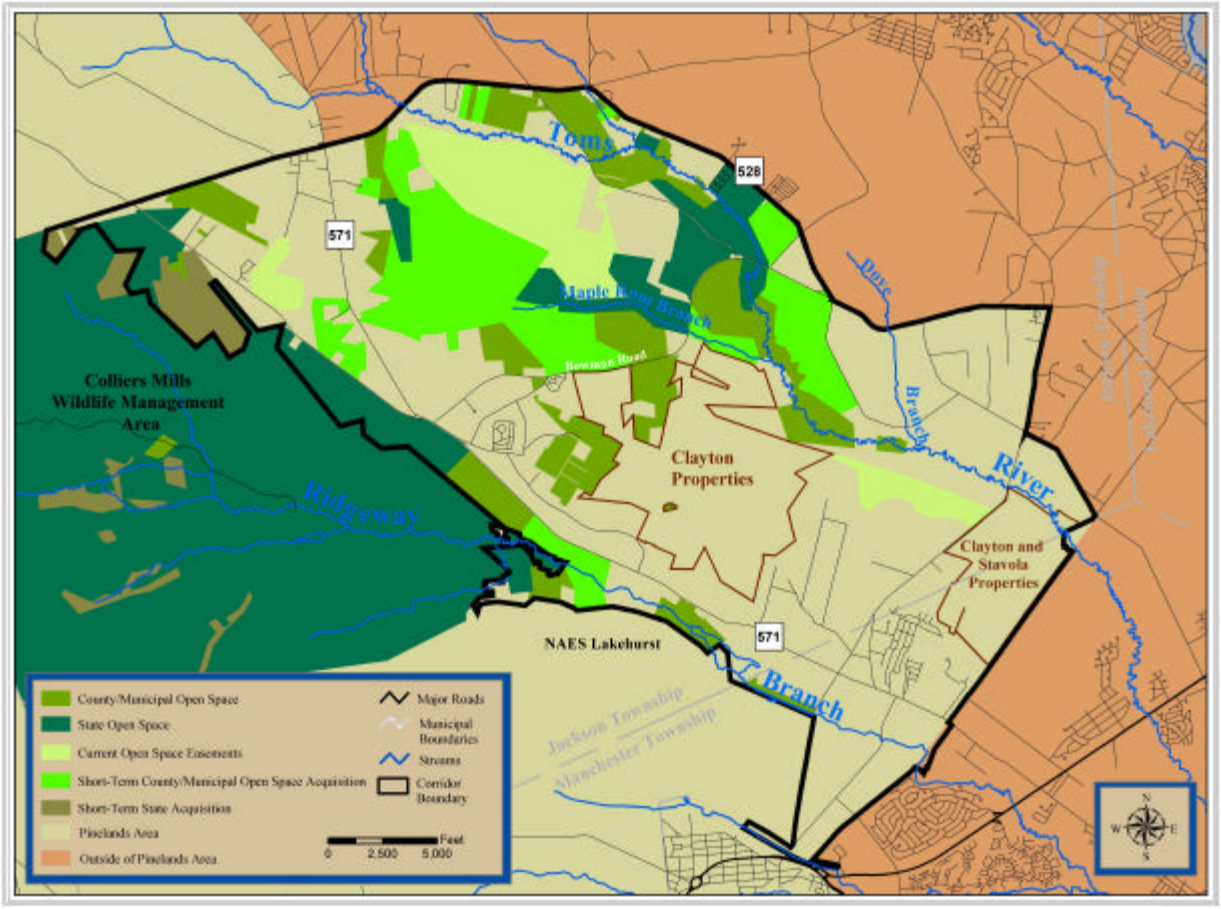

Figure 15. Current and Proposed Open Space Acquisitions and Easements.

4. Fee Simple Land Acquisition

Acquisition, if coupled with effective stewardship of protected lands, is the most direct means of ensuring the permanent preservation of natural resources associated with the properties.

The State of New Jersey is the principal holder of open space within the Pinelands and is in the best position to acquire significant tracts of land as well as manage those lands for the purposes of preservation. The State is currently pursuing specific acquisition opportunities inside the Toms River Corridor (Figure 15). One particularly large tract, totaling nearly 1,000 acres of forested wetlands and uplands would, if acquired, permanently protect the pristine core of the forested area. DEP's Green Acres office is also investigating the possibility of acquiring at least one large property situated along the Toms River that would reinforce the connector between T&E populations situated in the eastern and western portions of the Corridor. NJDEP will continue to update the Task Force on its progress in acquiring these and possibly other open space targets within the Corridor.

Jackson Township is actively pursuing possible acquisition opportunities within the Township's Regional Growth Area, particularly along the north bank of the Toms River. The Township's primary focus is on two parcels of land known as Megan's Run and the

Grawtown Road tract, large forested tracts on the north side of the Toms River, which are currently zoned for residential development at a density of 2-3 du/ac. Jackson has placed these two parcels, as well as other possible acquisition targets, on the Township's official map as planned open space conservation areas.

Ocean County and non-profit organizations such as the New Jersey Conservation Foundation, The Nature Conservancy, and the Trust for Public Land continue to pursue land acquisition on an opportunistic basis throughout the study area and beyond.

The Toms River Task Force encourages all the organizations to continue to pursue these acquisition objectives and to coordinate their efforts.

5. Use of Wetlands Stream Buffers as a Core to a New Upland Connector between T&E Nodes

To further the contiguity of important wildlife T&E nodes, two types of connectors are suggested for the Toms River Corridor. One type, as discussed above, is to connect T&E nodes through acquisition and/or various land use regulations. The other utilizes the existing stream systems and maximizes their effectiveness as a T&E node connector.

Several studies have suggested that wetlands stream buffers may be effective in providing area for various physical and chemical filtration processes that protect water resources (Castelle et al., 1992, 1994). In the Pinelands, under the CMP, a 300-foot wetland transition area is currently required when T&E species are present. However, to protect upland habitat for wildlife species that rely upon wetlands for only part of their habitat needs, protection of a landscape matrix of upland and wetland Pinelands habitats, rather than wetland buffers alone, is important (Spackman and Hughes, 1994; Zampella et al., 1994; Burke and Gibbons, 1995; Rogers and Smith, 1995; Semlitsch, 1998).

One strategy for protecting the upland-wetland matrix is to establish an expanded buffer that encompasses both habitat types and provides a connector that may allow wildlife to move from one habitat area to another. Although effective connectors vary by species and no set width has been established for each species (Environmental Law Institute, 2003), a 600-foot upland connector (300 additional feet adjacent to each wetland buffer) is recommended along the Toms River and Ridgeway Branch to expand the protection of upland habitat that helps to connect T&E nodes (Figure 16). However, such a corridor must contain sufficient upland area for the variety of species in question and not be rendered ineffective by deleterious impacts of residential and commercial development. Woodlands located next to such development lose their effectiveness as habitat for woodland species because these "edges" tend to be associated with increased predation and other hazards such as roadways (Environmental Law Institute, 2003).

Some researchers have suggested a range of buffer widths adequate to protect wetland-upland habitat. For example, Semlitsch and Bodie (2003) summarized data from published literature on the use of terrestrial habitats by amphibians and reptiles associated with wetlands (i.e., permanent and temporary ponds and stream habitats). Among the literature

included in this review are studies on the timber rattlesnake and on the Pine Barrens tree frog. The review incorporated data from 19 frog and 13 salamander species (1,363 individuals) and 5 snake and 28 turtle species (2,245 individuals). Average linear migration distances into terrestrial habitats from the edge of aquatic habitats ranged from 466 to 948 feet for reptiles and amphibians collectively. To buffer this core terrestrial habitat from potential edge effects of adjacent land uses, the authors added 50 meters (164 feet) and therefore recommended a total linear distance of 630 to 1,112 feet from the edge of the aquatic habitat. Although this review targeted semi-aquatic species, it illustrates the need to protect both core habitat and a terrestrial edge buffer. The proposed additional 300 feet buffer in the Toms River Corridor, when compiled with the wetlands (from the river banks) and their 300-foot wetlands buffer, is roughly equivalent to this review's proposed buffer width.

Pine snakes, though primarily upland species, have been shown to frequent adjacent wetlands. Based upon 1½ years of study begun in September 2002, Walter Bien, Assistant Director for the Center for Biodiversity and Conservation and Director of Pinelands Research and Studies at Drexel University, tracked 10 northern pine snakes implanted with radio transmitters in Burlington County, New Jersey (personal communication). These pine snakes ranged up to 6,000 feet. Although the timing between check points varied, they were located 14-20% of the time in wetlands, with the remaining time spent in surrounding uplands. Thus, a 600-foot upland corridor might be minimally sufficient to provide for both upland and wetland habitat requirements of the pine snake. Several pine snakes in the study have hibernacula within 30 meters (98 feet) of wetlands, indicating that documented snake populations would be aided by a combination of protected wetland and upland forest habitat.

Robert Zappalorti, Executive Director and President of Herpetological Associates, Inc., established the activity range of free-roaming northern pine snakes that were monitored with the use of radiotelemetry. Three studies, including one in 1992 at the New Jersey National Golf Course Property (in the Toms River Corridor) and one in 1995 at Naval Air Engineering Station Lakehurst (adjacent to the Toms River Corridor), documented that, during summer seasonal migration movements, 21 adult pine snakes used from 43.46 acres to 398.88 acres of available pine-oak habitat (with a mean activity range of 125.29 acres). If this median range was a perfect circle, the diameter of the range would be approximately 1,300 feet. While pine snakes show no preference for nesting or hibernating within wetlands, they often forage or cross various wetlands. Some pine snake nesting areas have been found on ridge-lines in the close vicinity of wetlands (Burger and Zappalorti, 1986 and 1991). Clearly, northern pine snakes use wetlands for feeding, resting, and migrating, thus this body of evidence supports further protection of the associated upland habitat. Additional landscape approach for habitat protection seems reasonable for these terrestrial pine snakes given the fact that their mean home-range size is 125.29 acres (Zappalorti, personal communication). A final notable factor is that pine snake activity, nests, and hibernacula have been found in the Toms River Corridor adjacent to wetlands.

Given the generally recognized desirability for connectors between concentrations of T&E species, the scale of the illustrative buffers noted in the literature, the demonstrated range and activity patterns of pine snakes, the documented presence of pine snake activity in and

adjacent to the connectors, and the special geographical circumstances present in the Toms River Corridor, a 300-foot addition to wetlands buffers in the Toms River Corridor is necessary and reasonable.

Figure 16 illustrates the sections of the streams that warrant enhanced buffering and the extent of the additional 300-foot uplands corridor. The area falling within this 600-foot upland corridor (excluding the wetlands themselves but including the currently regulated buffers) is estimated to be roughly 1,563 acres, mostly in Jackson Township. Of this, about 900 acres represent portions of currently vacant lots and another 286 acres are part of public land holdings. Thus, the impacts on landowners will vary.

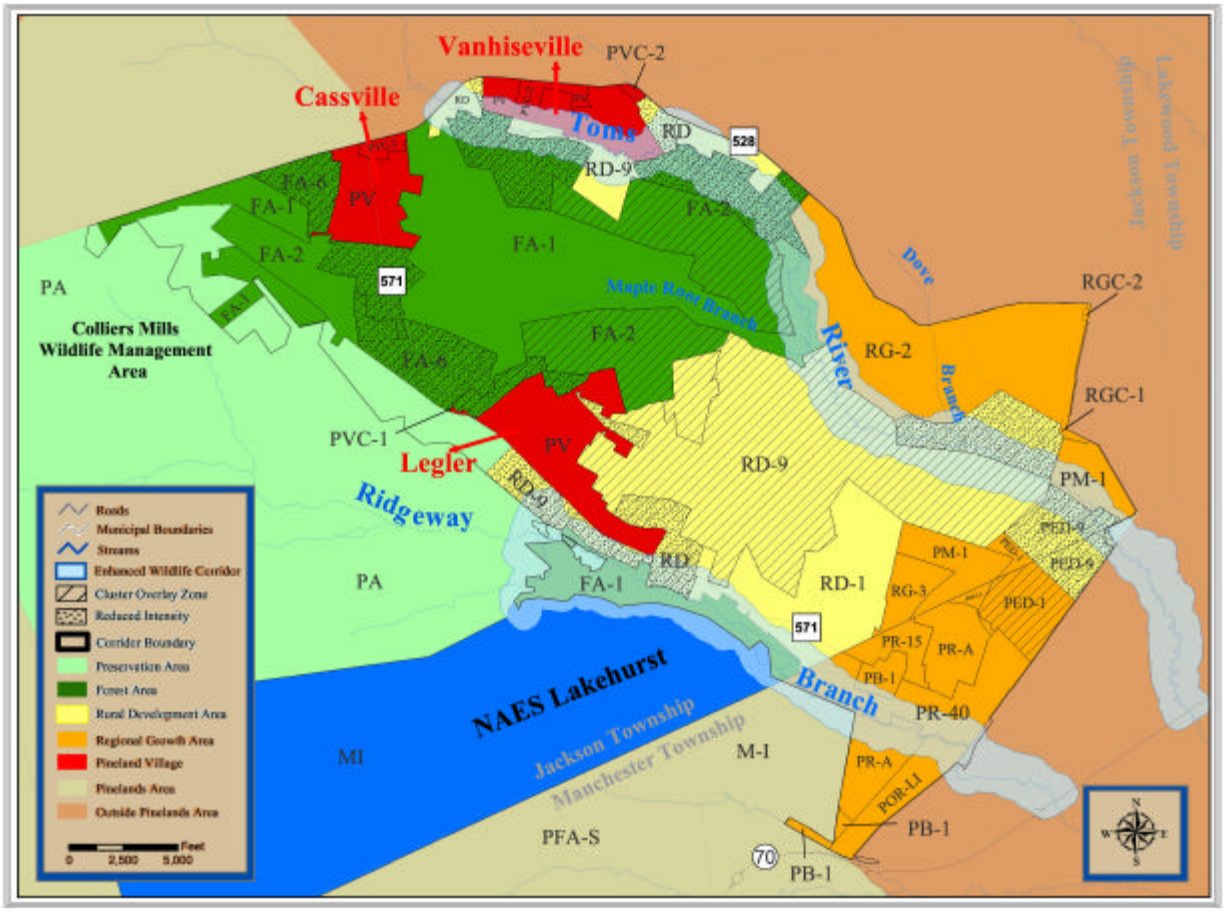

Figure 16. Proposed Land Protection Tools.

In extending the existing wetlands buffers to a distance of 600 feet, the townships should include relief mechanisms for landowners whose properties fall largely or completely within the newly protected areas. Preliminary analysis has identified 75 vacant properties which could have their buildable acreage significantly reduced as a result of the imposition of the new 300-foot uplands corridor added to the 300-foot wetlands buffer. Most of these are located in the Legler area along the Ridgeway Branch. Minimal development opportunities for these properties will need to be preserved through various mechanisms, such as required

clustering on the least environmentally sensitive portions of the property; permitting a single unit within the 600-foot buffer area; or, if even a single unit would intrude too far into the buffer and adversely impact critical habitat, use of the CMP's Waiver of Strict Compliance process.

It should be noted that this new buffer might also help to better protect the wetlands. For example, a recent study of streams in the Chesapeake Bay watershed (Lindsey et. al., 2003) demonstrated that most of the nitrogen entering Pokomoke Creek is through ground water discharge associated with relatively short ground water flow paths that generally originate close to streams, and that denitrification appears to affect mostly older ground water associated with longer flow paths that generally originate farther from streams. While this study did not specifically examine effects of buffers, as summarized by Castelle and others (1994), the results would seem to provide additional support to the concept that wetlands stream buffers might act to protect water quality with regard to nitrogen.

6. Revised Approach for Threatened and Endangered Species Survey Requirements

The development of this plan was motivated in part by a recognition that the long-term survival of populations of T&E plants and animals is best served by a regionally-based land use program that protects large, contiguous habitat areas—not by piecemeal measures that are applied on a site-by-site basis as properties are proposed for development. In recognition of this regional approach, the Task Force advocates that the site-by-site survey and protection measures typically used be tailored to reflect the overall conservation measures proposed in this plan.

A subcommittee of the Task Force, including representatives from the Pinelands Commission, the New Jersey Conservation Foundation, NJDEP, and the Pinelands Preservation Alliance, developed a set of recommendations that tailors the property-specific survey procedures to zoning districts and, in some cases, to the type of development being proposed. The goal of these recommendations is to implement procedures and standards for meeting the existing T&E plant and animal habitat protection rules of the Pinelands Comprehensive Management Plan (CMP) and certified municipal ordinances within the Toms River Corridor Natural Resource Protection Area, in light of proposed land use regulation changes being developed by the Task Force. This systematic approach recognizes the habitat conservation measures achieved by the plan, simplifies the survey process and provides greater certainty to property owners and regulators.

The proposed measures attempt to match the scope and intensity of the survey to the suitability of the area for T&E species habitat, the level of other protection measures (e.g., mandatory clustering, wetlands buffers, etc.) in place and the pattern of existing development. In addition, the measures provide an incentive to minimize development impacts by waiving survey requirements for "single family infill development," i.e., a single-family dwelling within 300 feet of a preexisting public road or development that contains a driveway no longer than 300 feet and disturbs an area of one-half acre or less

(with a deed restriction on the remaining undeveloped portion of the property). However, these recommendations are appropriate only if the proposed changes in zoning, Management Areas, clustering provisions, and buffers proposed in the Toms River Corridor Natural Resource Conservation Plan are implemented.

The following is a description of the main elements of the recommended survey approach and its implementation in the Corridor.

a. Conditions for requiring threatened and endangered species surveys

The subcommittee recommends that different standards for requiring/not requiring a particular survey be applied according to the Pinelands Management Area/zoning of the parcel, the size of the parcel, and the surrounding land uses. This approach is justified because the proposed municipal zoning and other initiatives being recommended by the Task Force provide a strong framework for protecting the critical habitats most essential for the long-term survival of T&E species across the Toms River Corridor.

Depending on the location and type of development proposed, the subcommittee recommends the use of one or more of the methods described below to determine whether evidence of T&E species might be present on the development site. (See Appendix D for a map and chart outlining the types of surveys and assessments required for each zone.)

Note: The Toms River Corridor Natural Resource Protection Plan provides certain relief mechanisms for owners of properties located within the 600-foot River Buffer Area, including the ability to cluster on less environmentally sensitive areas and the possibility of transferring development rights to more appropriate development locations (see Section IV.A.2.). Any development permitted within the 600-foot Buffer Area under the provisions of such a relief mechanism would require a Full Survey of the development area (FS2).

b. Survey/assessment types

In some zones, when the development application is limited to single-family dwellings disturbing no more than one-half acre of land ("Single-Family Infill," see Appendix D), and for certain development proposals which utilize planning tools (e.g., clustered development) that reduce or minimize negative impacts on local populations of T&E plant and animal species, a reduced survey requirement is recommended. However, should compelling evidence of T&E species be discovered by Pinelands Commission staff during a routine site visit, the subcommittee recommends that the applicant be required to either:

?? Move the "footprint" of the development to an alternate area of the site to eliminate or mitigate the impact to T&E species; or

?? Engage a consultant to complete a one-day visual survey within the development area. This type of survey should be used to determine whether there are T&E plants present and/or whether there is evidence of habitual seasonal use (i.e., nesting/denning areas) by T&E animal species of the area to be cleared or developed.

This survey should either confirm that an alternate development site should be selected or indicate that the proposed development is not likely to have a negative impact on T&E species and may be constructed as planned.

When a clustered subdivision is proposed, a **Habitat Assessment (HA)** of the entire property should be required to identify an appropriate location for development that will minimize impacts to T&E species. The purpose of this assessment is to identify the clustered development area that is least likely to result in adverse impacts on T&E species. It should require, at minimum, the following elements:

i. Collection and reporting of all NJDEP and Pinelands Commission data on T&E plant or animal species sightings on the parcel and adjacent parcels;

ii. Reporting the soil, vegetation and topography of the parcel, with ground verification as necessary; and

iii. An adequate analysis of the quality of the parcel as habitat for any T&E species potentially present on the property.

(Note: after site selection is complete, a Full Survey of the development area (FS2) should be required in most cases; see below.)

In some zones and under certain conditions (Appendix D), a Full Survey of either (1) the entire parcel or (2) the area to be cleared or developed should be required to determine whether any T&E plants are present and/or whether there is evidence of habitual seasonal use (i.e., nesting/denning areas) by T&E animal species:

- **FS1: Full ground survey of the entire parcel.** This type of survey should be conducted according to standard practices accepted by the Pinelands Commission, which may include use of drift fencing, trapping, daily inspections and opportunistic sampling. The Full Survey may require work over two full active seasons of T&E animal species potentially present. For T&E plant species, surveys should generally be conducted over one growing season.

- **FS2: Full ground survey of development site (area tobe permanently cleared and/or developed, plus 300 feet around the area to be cleared/developed).** This type of survey is the same as FS1, but the area of the survey is determined by the area to be cleared or developed under the applicant's proposals.

c. Implementation of threatened and endangered species survey approach

The subcommittee recommends that the municipalities adopt, and the Pinelands Commission certify, ordinance or Master Plan findings that specify that:

?? The entire Toms River Corridor is designated a "Special Threatened and Endangered Species Protection Zone";

?? Within the Corridor, it is presumed that all land is important for T&E species habitat, except those parcels within the revised boundaries of any zoning district for which no T&E survey is required (Pinelands Village, RD-1, PED-1, Jackson's PM-1 southern part, Jackson's RG-3, Jackson's RG-2 eastern part, and Manchester's RGA);

?? The presence of T&E habitat in the Corridor can be accommodated by the use of the Single Family Infill development method (Appendix D) or by appropriate site investigations conforming to the type required for each Management Area/zone as described above; and

?? The work plan/survey protocol must be approved by Pinelands Commission staff prior to beginning the survey.

7. Water Quality: Adopt Improved Wastewater Treatment Systems and Well-head Protection Measures

A significant, but not easily quantified, source of pollutants to ground water is on-site septic systems. Almost the entire Corridor is currently un-sewered, with septic systems serving existing development. The effectiveness of the standard types of systems is dependent on upkeep and maintenance by the homeowner, but they typically do little to reduce the introduction of pollutants into the environment.

Both Manchester and Jackson Townships have adopted ordinances to implement the Pinelands Commission's Pilot Program for Alternate Design Wastewater Treatment Systems, thereby authorizing the use of five new technologies for wastewater treatment for residential development on lots as small as one acre. Unlike conventional septic systems or pressure dosing systems, the five identified alternate technologies have been demonstrated to be highly effective in reducing nitrogen levels in domestic wastewater. Authorization of the Pilot Program systems will allow for the continued development of one-acre lots within the Pinelands Villages and the unsewered portions of the Regional Growth Area while remaining in compliance with the water quality standards of the CMP.

Wells are typically sited close to the population to be served, i.e., in the areas targeted for development. As such, they need to be afforded protection from nonpoint source pollution associated with development. Therefore, the Task Force recommends the municipalities consider protecting well-heads though the development of well-head protection ordinances.

B. Long-term

1. Changes to Comprehensive Management Plan Density Prescriptions Based on Study of Housing Demand and Supply

In response to questions regarding the appropriateness of the levels of current and available future development within the Regional Growth Areas throughout the Pinelands, the Pinelands Commission has initiated an in depth assessment of regional housing supply and demand. A task force of experts and concerned parties is being formed to review population projections, apportion future housing obligations, and eventually provide recommendations to the Commission.

This initiative could affect the allowable building densities within the Toms River Corridor since both Jackson and Manchester have Regional Growth Area designations in the Corridor. Both Jackson and Manchester Townships will be encouraged to participate in this process, as the findings could lead to amendments to the residential development densities currently prescribed by the Comprehensive Management Plan (CMP).

2. Expansion of the Pinelands Development Credit Program

The CMP contains an innovative and successful transferable development rights program known as the Pinelands Development Credit (PDC) Program. Under this program, PDCs are allocated to lands in designated "sending" areas and may be sold to developers seeking to build in the Regional Growth Area. Owners of parcels within the sending areas may cho ose to sever the PDCs from their properties. Once severed, the lands from which the PDCs originated are permanently protected through deed restriction. Municipalities with Regional Growth Areas, such as Jackson and Manchester Townships, are required to p rovide for the opportunity to use PDCs for residential development.

Sending areas are currently limited by the CMP to the Preservation Area District, Agricultural Production Area, and Special Agricultural Production Area. The Pinelands Commission is planning to explore the possibility of expanding the Program so that Credits would be awarded to properties in the Forest Area and/or other land possessing special ecological attributes, such as critical habitat for threatened or endangered species.

This may provide another mechanism by which additional natural resources of the Pinelands can be protected, although expansion of the Program would be contingent on the availability of sufficient and appropriate "receiving" areas for the transferred development. This is a matter of some concern in the Toms River Corridor since the Regional Growth Areas themselves are the target of preservation measures due to the presence of T&E species and other valued natural resources within those zones.

3. Expansion of the Density Transfer Program and Clustering

Like the PDC Program, the density transfer program involves the transfer of development rights from designated "sending" to "receiving" areas within Forest and Rural Development management areas. Originally designed to provide recourse for owners of undersized lots, the concept has been broadened in some municipalities to serve as an effective means of protecting environmentally sensitive land. As presently constituted, the program is applicable only in Forest Area and Rural Development Area zones and only to the degree that a municipality has incorporated the relevant principles and stipulations into its municipal ordinances. Should a municipality and the Commission wish to pursue it, the possibility exists that the program could be expanded to allow for the inclusion of more management areas as well as the transfer of units across management area boundaries.

An allowance for inter-management area density transfer could present considerable opportunities for land protection within the Corridor, particularly if units were transferred from large lots in the Forest Area to much smaller (one-acre or less) lots within neighboring Pinelands Villages. This could serve to protect large tracts of environmentally sensitive forested land where the zoning permits few units to be built while enhancing, albeit to a modest degree, the "village" character of communities like Cassville and Legler.

On a related matter, clustering is generally permitted by the CMP on 3.2-acre lots in the Forest Area. The 3.2-acre lot size requirement was imposed to avoid undue impacts where the homes are clustered. Conversely, clustering on even smaller lots might better protect the surrounding land and might better recognize that the area within the cluster is not valuable habitat for T&E species. While this plan recommends use of one-acre clustering in special circumstances around the Villages, broader expansion of the concept into the Forest Area zones would require a CMP amendment.

The Task Force recommends that the Pinelands Commission evaluate these and other opportunities to broaden this program.

4. Community Wastewater Treatment

Construction of multi-unit, efficient wastewater treatment facilities should be pursued at the municipal level. These facilities will serve multi-purposes, (1) reduce the negative environmental impacts of poorly maintained individual household septic systems, (2) allow for a higher intensity of development in the areas that are zoned to accommodate it, and (3) eliminate the impacts of inter-basin transfer of water that may result from centralized wastewater collection and treatment.

Jackson Township should investigate the environmental benefits and economic feasibility of constructing community wastewater treatment systems within its Pinelands Villages. In addition to environmental benefits, this may enable villages to serve as receiving areas for development transfers from other areas within the corridor.

5. Changes to Mining and Land Restoration Regulations

Resource extraction operations have profound impacts upon the landscape both during and for many years after the period of active mining. The Pinelands CMP and individual municipal ordinances regulate mining practices and prescribe restoration standards. The Task Force requested that the New Jersey Conservation Foundation and the New Jersey Audubon Society research the effectiveness of current mining regulations including land restoration provisions, and looks forward to reviewing the results of this analysis in the future.

6. Environmental Considerations in Existing and New Road Design

Anecdotal evidence suggests that pine snakes, timber rattlesnakes, and other T&E reptile and amphibian species are at risk from traffic on several major roads in the Toms River Corridor, including County Routes 539, 571, and 528. At least one source suggests that populations of timber rattlesnakes in the Pinelands suffer excessive mortality of gravid females due to vehicular road traffic (Zappalorti and Reinert, 1992). Moreover, where existing roads pose a barrier between two habitat areas, it is likely that animals will attempt to cross these roads in the course of their regular breeding and dispersal activities.

Several studies have suggested that reptile and amphibian road mortality may be reduced through the use of "underpasses" or road culverts, usually in combination with drift fencing to direct animals to travel below the road surface (Jackson, 1996; Johnson et al., 2000). These measures may be implemented at identified road mortality "hot spots" on existing roads.

Traffic moving at higher rates of speed may have a disproportionate impact on T&E species mortality, as driver awareness of the road surface and response time may be inadequate to prevent an accident. The Task Force recommends that the New Jersey Department of Transportation and Ocean County implement appropriate "traffic calming" measures on existing roads where T&E species are known or are likely to cross. These measures, including lower speed limits, rumble strips and various types of curb extensions, are designed to slow traffic, reduce traffic volume, and/or make drivers aware that they are entering an area of some special significance. Educational signage (e.g., "Caution: Wildlife Crossing") may also be used as an additional safety measure.

7. Further Reduction of Impacts from Outside the Toms River Corridor

Although the Toms River Corridor's northern boundaries are drawn at the edge of the New Jersey Pinelands, potential impacts to the Corridor also originate from outside this border (e.g., see water quality data, Section II.B.2., for the main stem of the Toms River). For example, development and agricultural activities outside the Pinelands, but within the Toms River watershed, may affect water quality in the river and its tributaries through stormwater

runoff, which is typically associated with impervious surface coverage (e.g., roads, rooftops, and parking lots).

Similarly, water supply is a significant issue that transcends Corridor boundaries. Development increases in impervious surface coverage (particularly in upstream areas) can reduce stormwater recharge of ground water supplies and result in reduced streamflows, as can ground water withdrawals through water supply wells through out the Toms River water supply planning area. This is of particular concern in areas where interbasin transfer of water occurs, i.e., where wastewater is discharged to the ocean or to a different watershed than the one from which the water was originally drawn.

NJDEP has begun an effort to evaluate the estimated water supply availability and demand numbers to verify that the deficit estimate is accurate. The results of this evaluation should be used to guide future actions in this area.

8. Survey Guidelines for Threatened and Endangered Species

The Task Force recommends that the Pinelands Commission finalize the protocols for conducting T&E species surveys. Furthermore, the Commission should consider the development of species-specific design guidelines that would prescribe treatments when various situations are discovered during surveys. This can be done cooperatively with NJDEP as the agency revises its approach for the protection of important habitat for T&E species.

V. EXPECTED RESULTS

Under the zoning plans currently in place, the 9,400 vacant acres remaining in the Toms River Corridor were expected to accommodate various levels of development intensity, primarily residential development ranging in density from a high of 6du/ac to a low of 1du/70ac. Ecosystems were to be protected by low density zoning in the Forest and Rural Development Areas and T&E species were to be dealt with on a site-specific basis as development projects were proposed and submitted to the Commission for review.

The recommendations of this report, if implemented, would result in a reduction in development potential for 3,060 acres, equating to a reduction in residential zoning capacity of approximately 2,600 units. These reductions will reduce forest fragmentation and reduce negative impacts associated with development. For example, these density reductions may decrease impervious surfaces by up to 300 acres, reduce wastewater loading by almost 0.7 million gallons per day (mgd), and decrease the potential for consumpti ve interbasin transfer of wastewater by approximately 0.6 mgd. Development potential would remain concentrated in four areas:

Jackson Township's three Pinelands Villages and the Regional Growth Area on the eastern edge of the Corridor. In the areas outside these "centers," cluster development would become the preferred and, in many cases, required pattern of future development, leading to the permanent conservation of large tracts of environmentally sensitive land (Figure 17). Additional lands in the Corridor are likely to be protected through the ongoing acquisition efforts of the State, County, municipalities and non-profit conservation organizations. Such acquisitions will not only provide permanent protection to important lands but will also relieve development pressure within Jackson and Manchester Townships. Of equal importance, the regional, systematic approach to habitat conservation proposed in this report will largely eliminate the need for ad hoc measures to deal with the on-site presence of T&E species. Instead of land use conflict, certainty would be provided for both the ecosystem and the affected property owners. It must be noted that these steps, like the current CMP zoning for this area, are not absolute in their protection. They lessen impacts and ensure protection of larger ecosystems.

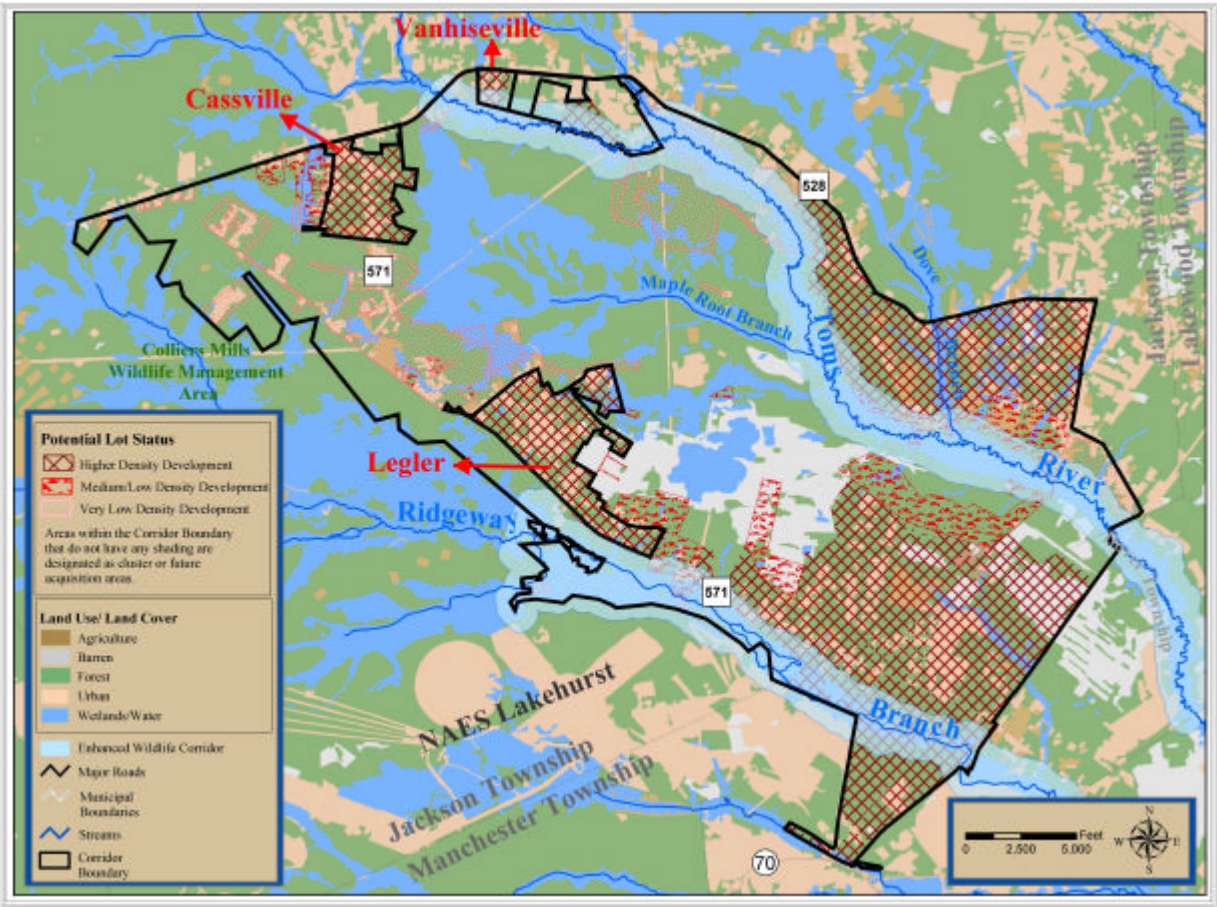

Figure 17. Potential Future Landscape of the Toms River Corridor after Implementation of Proposed Changes.

While a primary impetus for this plan was the discovery of T&E species in designated growth areas, the importance of protecting other natural resources was also recognized. The tools noted above serve to protect all these resources, as evidenced by comparing the protected areas to the T&E nodes and connectors (Figure 18). As Figure 18 demonstrates, there will be little if any development in the area of the T&E nodes, as densities have been lowered and development clustered away from the T&E nodes.

The T&E nodes are connected through two mechanisms. T&E Node B is linked to T&E Node C by the expanded buffer along the Toms River main stem. Portions of this expanded buffer also better protect and expand each of these T&E nodes. T&E Node B and T&E Node A are primarily connected through the second mechanism aimed at maintaining "permeability" (i.e., the ability of T&E species to traverse the area) by reducing the level of development between these two T&E nodes and requiring such development to be clustered in order to maintain forest cover on the bulk of the sites (e.g., along Rote 571).

When T&E Node B is expanded, an expanded buffer along the Ridgeway Branch will help to link it to T&E Node A. The eastern portion of this buffer will help protect rattlesnakes and pine snakes seen in the area.

In all cases, T&E node and connector protection may be aided by fee simple acquisition where possible.

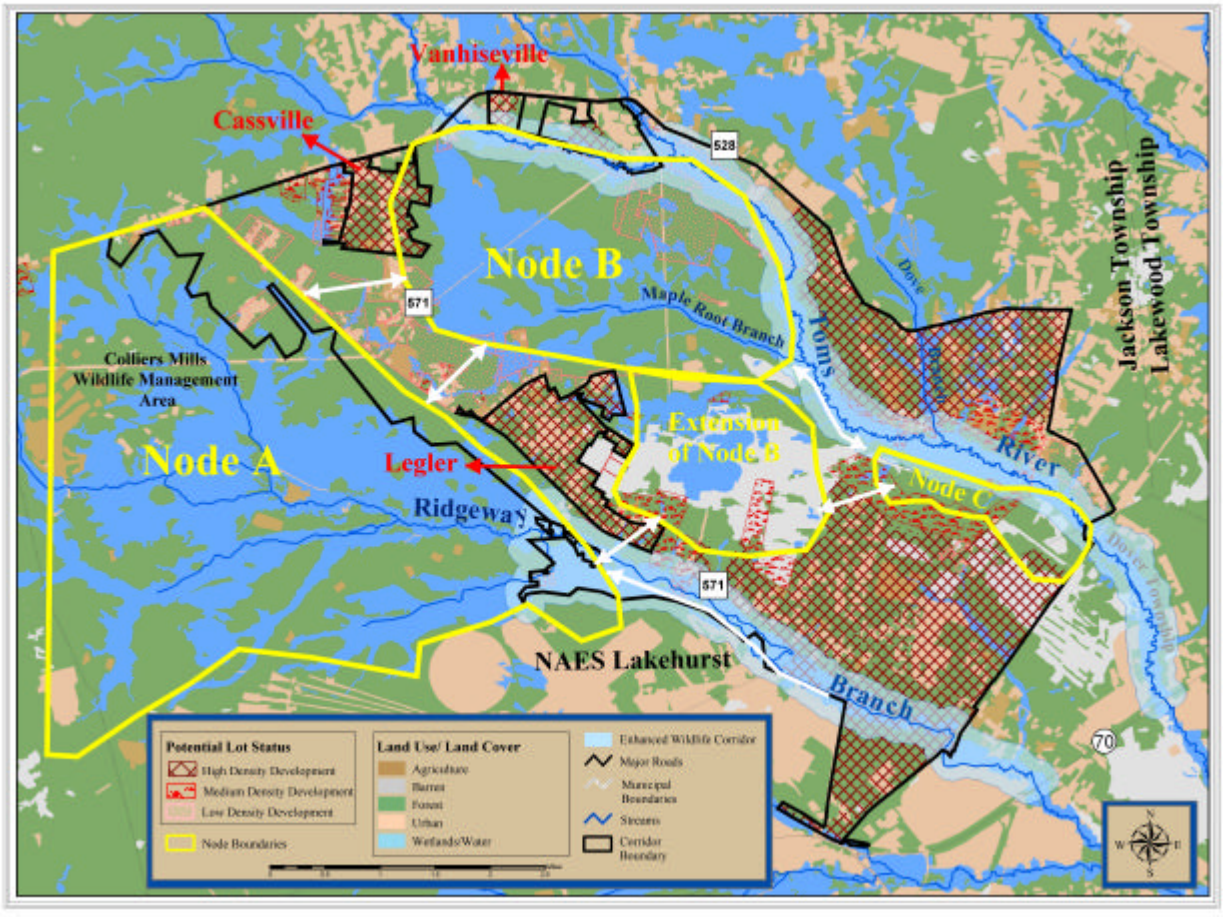

Figure 18. Effectiveness of Potential Future Landscape to Protect Nodes and Connectors.

Similarly, a comparison of the Corridor's potenti al future landscape to its water resources (Figure 19) shows substantial areas of no and low-density development that will serve to preserve both water quality and surface water features (recharge areas, streams, and wetlands).

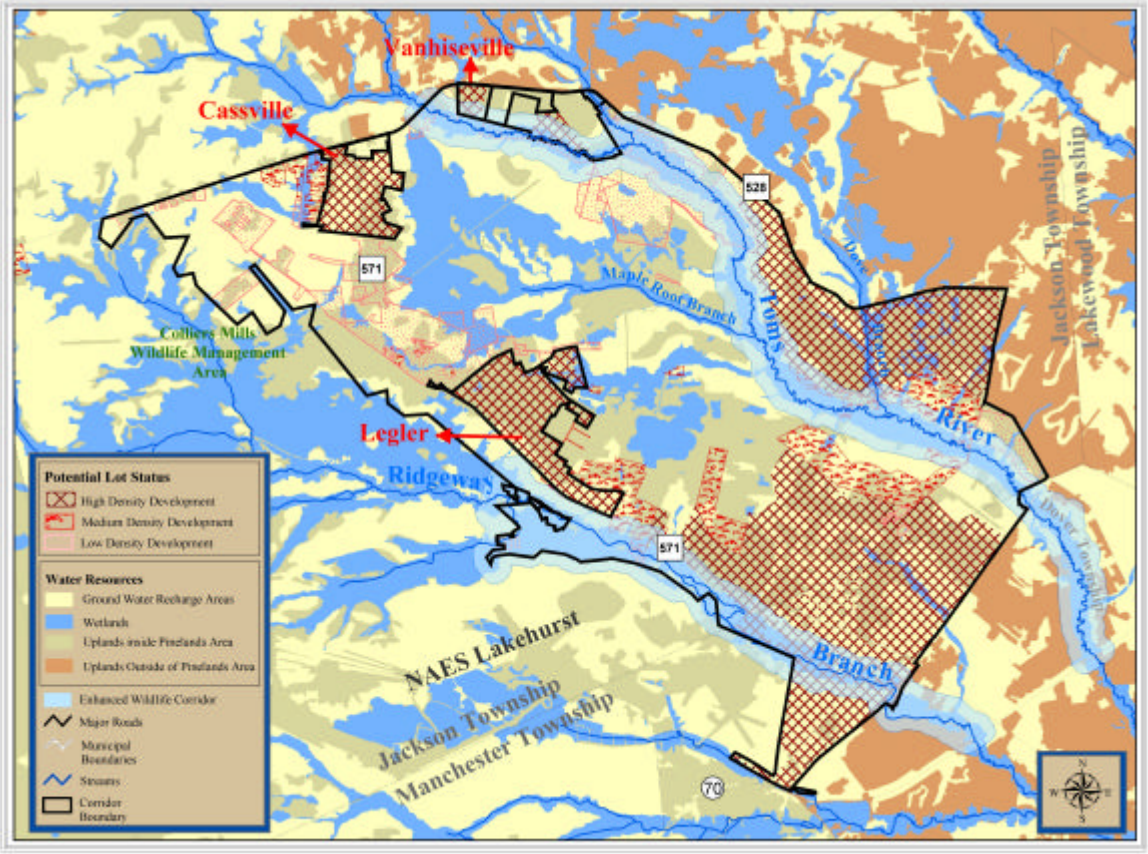

Figure 19. Effectiveness of Potential Future Landscape to Protect Wetlands and Groundwater Recharge.

In conclusion, the Task Force finds that these recommendations, when implemented, will afford much better protection of the region's natural resources, including habitat for T&E plants and animals and water resources.

LITERATURE CITED

Beans, B.E. and L.J. Niles [eds.]. 2003. Endangered and Threatened Wildlife of New Jersey. Rutgers University Press: New Brunswick.

Beier, P. and R.F. Noss. 1998. Do Habitat Corridors Provide Connectivity? Conservation Biology 12: 1241-1252.

Bunnell, J.F., R.A. Zampella, R.G. Lathrop, and J .A. Bognar. 2003. Landscape Changes in the Mullica River Basin of the Pinelands National Reserve, New Jersey. Environmental Management 31: 696-708.

Burger, J. and R. A. Zappalorti. 1986. Nest Site Selection by Pine Snakes, Pituophis melanoleucus, in the New Jersey Pine Barrens. Copeia 1986: 116-121.

Burger, J., and R. T. Zappalorti. 1991. Nesting Behavior of Pine Snakes (Pituophis melanoleucus melanoleucus) in the New Jersey Pine Barrens. Journal of Herpetology 25: 152-160.

Burke, V. J. and J. W. Gibbons. 1995. Terrestrial Buffer Zones and Wetland Conservation: A Case Study of Freshwater Turtles in a Carolina Bay. Conservation Biology 9: 1363-1368.

Castelle, A.J., C. Conolly, M. Emers, E.D. Metz, S. Meyer, M. Witter, S. Mauermann, T. Erickson, and S.S. Cokke. 1992. Wetland Buffers: Use and Effectiveness. Adolfson Associates for Shorelands and Coastal Zone Management Program, Washington Department of Ecology, Olympia, WA.

Castelle. A.J., A.W. Johnson and C. Conolly. 1994. Wetland and Stream Buffe r Size Requirements—A Review. Journal of Environmental Quality 23: 878-882.

Center for Plant Conservation. www.centerforplantconservation.org/

Coastal Zone Management Rules, N.J.A.C. 7:7E.

Deluca, M.J., Mattes, G.L., Burns, H.L., Thomas, A.M., and Gray, B.J., Doyle, H.A., 2000b, Water Resource Data, New Jersey, Water Year 2000, Volume 3. Water-Quality Data: U.S. Geological Survey Water-Data Report NJ-00-3: 618.

Deluca, M.J., Oden, J.H., Romanok, K.M., and Riskin, M.L., 1999, Water Resource Data, New Jersey, Water Year 1998, Volume 3. Water-Quality Data: U.S. Geological Survey Water-Data Report NJ-98-3: 450.

Deluca, M.J., Romanok, K.M., Riskin, M.L., Mattes, G.L., Thomas, A.M., and Gray, B.J., 2000a, Water Resource Data, New Jersey, Water Year 1999, Volume 3. Water-Quality Data: U.S. Geological Survey Water-Data Report NJ-99-3: 517.

Dow, C. L. and R. A. Zampella. 2000. Specific Conductance and pH as Indicators of Watershed Disturbance in Streams of the New Jersey Pinelands, USA. Environmental Management 26: 437-445.

Environmental Law Institute. 2003. Conservation Thresholds for Land Use Planners. Environmental Law Institute, Washington D.C.

Hunchak-Kariouk, Kathryn, and Nicholson, R.S. 2001. Watershed contributions of Nutrients and Other Nonpoint-source Contaminants to the Barnegat Bay-Little Egg Harbor Estuary: Journal of Coastal Research, Special Issue 32: 28-81.

Jackson, S.D. 1996. Underpass systems for amphibians. In G.L. Evink, P. Garrett, D. Zeigler and J. Berry (eds.) Trends in Addressing Transportation Related Wildlife Mortality, Proceedings of the Transportation Related Wildlife Mortality Seminar. FL-ER-58-96. Tallahassee, FL: State of Florida Department of Transportation.

Johnson, G., C. Parent, B. Kingsbury, R. Seigel, R. King and J. Szymanski. 2000. The Eastern Massasauga Rattlesnake: A Handbook for Land Managers. Fish and Wildlife Service, Fort Snelling, Minnesota 55111-4056.

Johnson, M.L. and M.K. Watt. 1996. Hydrology of the Unconfined Aquifer System of the Mullica River Basin, New Jersey, 1991-1992. U.S. Geological Survey Water-Resources Investigations Report 94-4234.

Lindsey, B.D., Phillips, S.W., Donnelly, C.A., Speiran,G.K., L. Niel Plummer, N.J., John -Karl Böhlke, Focazio, M.J., Burton, W.C., and Eurybiades Busenberg. 2003. Residence Times and Nitrate Transport in Ground Water Discharging to Streams in the Chesapeake Bay Watershed: U.S. Geological Survey Water-Resources Investigations Report 03-4035: 201.

Morgan, M.D. and R.E. Good. 1988. Stream Chemistry in the New Jersey Pinelands: the Influence of Precipitation and Watershed Disturbance. Water Resources Research 24: 1091-1100.

New Jersey Endangered and Nongame Species Conservation Act, N.J.S.A. 23:2A.

New Jersey Geological Survey
Digital Geodata Archive, New Jersey Geologic Survey
DGS02-3: Ground Water Recharge for New Jersey, available at URL
http://www.state.nj.us/dep/njgs/geodata/dgs02-3/dgs02-3.htm

Nicholson and Watt. 1997. Simulation of Ground Water Flow in the Unconfined Aquifer System of the Toms River, Metedeconk River, and Kettle Creek Basins, New Jersey: U.S. Geological Survey Water-Resources Investigations Report 97-4066: 100.

Noss, Reed F., Michael A. O'Connell, and Dennis D. Murphy. 1997. The Science of Conservation Planning: Habitat Conservation Under the Endangered Species Act. Island Press, Washington, DC.

Pinelands Comprehensive Management Plan, N.J.A.C. 7:50.

Ralls, K., J. D. Ballou, and A. Templeton. 1988. Estimates of Lethal Equivalents and the Cost of Inbreeding in Mammals. Conservation Biology 2:185-193.

Rogers J. A. Jr., and H. T. Smith. 1995. Set-back Distances to Protect Nesting Bird Colonies from Human Disturbance in Florida. Conservation Biology 9:89-99.

Semlitsch, R.D. 1998. Biological Delineation of Terrestrial Buffer Zones for Pond-breeding Salamanders. Conservation Biology 12: 1113-1119.

Semlitsch, R.D. and J.R. Bodie. 2003. Biological Criteria for Buffer Zones Around Wetlands and Riparian Habitats for Amphibians and Reptiles. Conservation Biology 17: 1219-1228.

Simberloff, D., J.A. Farr, J. Cox, and D.W. Mehlman. 1992. Movement Corridors: Conservation Bargains or Poor Investments? Conservation Biology 6: 493-504.

Spackman, S.C. and J.W. Hughes. 1994. Assessment of Minimum Stream Corridor Width for Biological Conservation: Species Richness and Distribution along Mid-Order Streams in Vermont, USA. Biological Conservation. 71(3): 325-332.

Watt, M.K. and M.L. Johnson. 1992. Water Resources of the Unconfined Aquifer System of the Great Egg Harbor River Basin, New Jersey, 1989-90. U.S. Geological Survey Water-Resources Investigations Report 91-4126.

Zampella, R.A. 1994. Characterization of Surface Water Quality Along a Watershed Disturbance Gradient. Water Resources Bulletin 30: 605-611.

Zampella, R. A., J. F. Bunnell, K. J. Laidig, and N. A. Procopio. 2003. The Rancocas Creek Basin: A Report to the Pinelands Commission on the Status of Selected Aquatic and Wetland Resources.

Zampella, R. A., R. G. Lathrop, J. A. Bognar, L. J. Craig and K. J. Laidig. 1994. A Watershed - Based Wetland Assessment for the New Jersey Pinelands. New Jersey Pinelands Commission, New Lisbon, New Jersey.

Zappalorti, R. and Reinert, in Tyning, T. F., editor. 1 992. Conservation of the Timber Rattlesnake in the Northeast. Massachusetts Audubon Society, Lincoln, Massachusetts.

MAP DATA SOURCES

All maps created by the New Jersey Pinelands Commission, December 2003—February 2004.

All Maps:

County Boundaries: New Jersey Department of Environmental Protection
Municipal Boundaries: New Jersey Department of Environmental Protection, 1997
Roads: New Jersey Department of Transportation, 1997
Streams: New Jersey Department of Environmental Protection, 1998

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Aerial Photography: Delaware Valley Regional Planning Commission, 2000

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Freshwater Wetlands: New Jersey Department of Environmental Protection, 1986
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APPENDIX A.
PINELANDS MANAGEMENT AREAS IN/ADJACENT TO THE TOMS RIVER CORRIDOR

Preservation Area District (PAD) - The heart of the Pines Barrens, from an environmental point of view, is the Preservation Area. Here one finds the pristine Pine Barrens rivers (including the Mullica, the Batsto, the Bass, Wading, and Oswego), unique forests of pygmy pines and oaks, cedar swamps, large public holdings (most notably Wharton State Forest) and the ruins of long-deserted towns and factories. To protect all this, the Comprehensive Management Plan (CMP) designated a 295,000-acre Preservation Area District where conventional residential, commercial and industrial development is largely prohibited. In general, only new land uses compatible with the ecology of the central Pines are allowed. Acceptable activities designed for minimal impact on the landscape are forestry, cultivation of berries and native plants, and operation of recreational facilities, such as canoe rental services and campgrounds. New residential development is also prohibited in the Preservation Area District, with a limited exception for certain long-time residents.

Forest Areas (FA) - Land outside of the Preservation Area that still meets certain criteria for "essential character" is designated as Forest Area. These areas generally adjoin the Preservation Area, but also extend far to the south, linked to the northern forest by a narrow undeveloped stretch between Hammonton and Egg Harbor City. Many of the same critical environmental features that characterize the Preservation Area are also found here - unpolluted streams, rare plants and animals, and pristine environments such as cedar swamps. Forest Areas within the National Reserve contain about 400,000 acres. About one-fourth of the total is already in public ownership as state forests, parks and wildlife management areas. About one-third, while in the National Reserve along the coast, is outside the Pinelands Commission's permitting jurisdiction (development there is subject to the state's Coastal Management Program, which is required to carry out the purposes of the state and federal Pinelands acts.) The same land uses that are permitted in the Preservation Area District are permitted in Forest Areas. Municipali ties are given the option of permitting certain other new uses, such as limited commercial establishments. Each municipality is also assigned a number of new housing units that may be built in its Forest Area. The CMP allows one new house for each 15.8 acres of privately owned, undeveloped upland. Municipalities are also allowed to cluster development on 3.2-acre lots in Forest Areas to minimize environmental impacts.

Rural Development Areas (RDA) - These transition zones account for 132,000 acres within the National Reserve. The CMP attempts to protect the characteristic Pinelands features that can be found in these areas while allowing modest development to proceed and giving municipalities as much leeway as possible to determine land uses. New housing is allowed at an overall density of 200 units per square mile of privately owned, undeveloped upland. In essence, the Rural Development Areas will function as safety valves, siphoning off development pressures that the Regional Growth Areas can't absorb. Local governments may plan for that spillover in advance by designating "municipal reserve areas" in their Rural Development Areas. These municipal reserves can be developed at the same densities as Regional Growth Areas once the adjacent growth areas are saturated and if a need for additional housing still exists.

Pinelands Villages - The traditional communities of the Pinelands are designated as Pinelands Villages. While a potentially wide range of development is permitted, the CMP requires that new uses be compatible with the character and magnitude of existing uses. Forty-four villages are located in the Pinelands National Reserve, three of which are in the Corridor: Cassville, Legler and Vanhiseville. The municipality in which a Village is located determines its boundary according to criteria listed in the CMP. Pinelands Towns are larger communities than Villages and pre-dated implementation of the CMP.

Regional Growth Areas (RGA) - To determine where development should be allowed and encouraged in the Pinelands, the Commission analyzed existing and anticipated growth patterns. The Commission found that new development was advancing primarily in three areas: the extension of the Philadelphia-Camden metropolitan area, the continuation of rapid development in Ocean County (largely comprising retirement communities), and the building boom set off by Atlantic City's casinos. The Commission then estimated the number of new housing units that could be accommodated and distributed them in municipalities found to be experiencing development pressure and capable of accommodating growth. The CMP stipulates base densities in regional growth areas ranging from 1 to 3.5 housing units per acre of developable land where sewers are available. Any other land use may be permitted at a municipality's option as long as the CMP's environmental standards are met. Regional Growth Areas within the state Pinelands Area total 80,000 acres; approximately half of this is considered developable. At the overall base densities called for in the CMP, 80,800 new housing units could be built in these areas. An additional 22,500 units could be built in these growth areas with the use of Pinelands Development Credits (PDCs), a transferable development rights program in operation in the Pinelands.

Military and Federal Installation Areas (MAFIA) - With their huge tracts of vacant land, the Pinelands were an obvious place for the government to locate military bases and similar facilities. These installations now occupy about 46,000 acres, with 30,000 acres in the Preservation Area. The four major ones are Fort Dix, McGuire Air Force Base, Lakehurst Naval Air Engineering Center, and the Federal Aviation Administration Technical Center in Atlantic County. New land uses are generally permitted if they are in keeping with the CMP's development standards. Activities essential to national security are exempt from Commission review.

RESOLUTION OF THE NEW JERSEY PINELANDS COMMISSION

NO. PC4-03-_____

TITLE: To Authorize the Permanent Land Protection Committee and the Staff to Pursue Permanent Land Protection Opportunities in the Toms River Wildlife and Elwood Corridor Areas and for the Formation of Task Forces to Further These Efforts

Commissioner _____ moves and Commissioner_____ seconds the motion that:

WHEREAS, the Commission has identified protection of lands possessing important natural and agricultural resources as one of its top priorities under the current work plan and through the ongoing Comprehensive Management Plan review process; and

WHEREAS, since 1980 more than 200,000 acres have been permanently protected in the Pinelands Area and Pinelands National Reserve through State and local acquisition as well as other land protection measures, much of this in targeted areas; and

WHEREAS, the Commission has and continues to play a crucial role in protecting land within the Pinelands, both through initiativessuch as the Pinelands Development Credit Program and by working in cooperation with other groups and agencies to identify preservation priorities and targets; and

WHEREAS, the Permanent Land Protection Committee seeks ways in which the Commission may enhance its land preservation efforts within the Pinelands; and

WHEREAS, based on information provided by staff on the distribution of natural resources, as many as twenty (20) additional permanent land protection study areas were identified within the Pinelands; and

WHEREAS, the Permanent Land Protection Committee has identified two (2) of these areas for more intensive study; these being the Toms River Wildlife Corridor in Jackson and Manchester Townships, Ocean County and the northern Elwood Corridor south of Wharton State Forest in Mullica Township; and

WHEREAS, these areas possess many characteristics that make their preservation a high priority among Pinelands land protection projects, including threatened/endangered species habitat, undisturbed forested cover, contiguity with public land, and mounting development pressures; and

WHEREAS, a number of land protection tools are available to pursue land preservation in these areas, as outlined in the attached project plans dated March 28th, 2003; and

WHEREAS, one of the important measures to be taken could be the formation of a Land Protection Task Force specific to each study area, to coordinate efforts and explore new initiatives as a means to better accomplish the goal of preservation, such task forces to include representatives of local and State government as well as non-profit conservation organizations, as outlined in the attached draft project plans; and

WHEREAS, the Permanent Land Protection Committee recommends that the Commission authorize it and the staff to pursue permanent land protection opportunities in these two areas; and

WHEREAS, pursuant to N.J.S.A. 13:18A-5h, no action authorized by the Commission shall have force or effect until ten (10) days, Saturdays, Sundays and public holidays excepted, after a copy of the minutes of the meeting of the Commission has been delivered to the Governor for review, unless prior to expiration of the review period the Governor shall approve same, in which case the action shall become effective upon such approval.

NOW, THEREFORE BE IT RESOLVED that the Permanent Land Protection Committee is authorized to pursue permanent land protection initiatives within the Toms River Wildlife Corridor and the northern Elwood Corridor, in general accordance with the attached project plans, dated March 28th, 2003.

BE IT FURTHER RESOLVED that the Executive Director is authorized to allocate the necessary staff resources to assist and support the Permanent Land Protection Committee in these efforts.

Record of Commission Votes

	AYE	NAY	NP	ABS		AYE	NAY	NP	ABS		AYE	NAY	NP
Ashmun					Hagaman					Tomasello			
Avery					Kowalski					Westergaard			
Brown					Lee					Wilson			
Campbell					Lloyd					Wuillermin			
Ficcaglia					McIntosh					Florio			

Adopted at a meeting of the Pinelands Commission Date: _____

_____

John C. Stokes
Acting Executive Director

_____

James J. Florio
Chairman

APPENDIX C.
Sample Conservation Easement

PREPARED BY:

_____
Signature

_____
Typed or Printed Name

DEED OF CONSERVATION EASEMENT

THIS INDENTURE is dated as of _____, 20___, by and between

(PROPERTY OWNER), having an address at _____, (hereinafter referred to as "Grantor") and

TOWNSHIP OF JACKSON, an incorporated municipality within the County of Ocean, State of New Jersey, having an address at _____, (hereinafter referred to as "Grantee").

WITNESSETH:

A. WHEREAS, Grantor is the fee simple owner of certain real property (hereinafter referred to as "the Property") known and designated as Block ___, Lot ___, on the tax map of the Township of Jackson, County of Ocean, State of New Jersey, which property is described in Schedule A annexed hereto.

B. WHEREAS, Grantee is a municipal body whose intent is to preserve and protect certain lands within the municipality that arecritical habitat for threatened and endangered species.

C. WHEREAS, the Legislature of the State of New Jersey has declared that the retention of land for open space purposes is important to the present and future economy of the State and the welfare of the citizens of the State. [NEED CITATION]

D. WHEREAS, a portion of the Property has been determined to contain critical habitat for threatened and endangered species. This portion of the Property is the Natural Area and is described in Schedule B. The physical features, vegetation, and other characteristics of the Natural Area have been or will be catalogued in the Baseline Documentation described in Schedule C and compiled in connection with the transfer of this Easement.

E. WHEREAS, the Natural Area has further been identified as providing critical habitat for a local population of (Pine snake / Timber rattlesnake / Corn snake / Other) , a (threatened) / (endangered) species in New Jersey. The Pinelands Commission has issued a Certificate of Filing stating that "no development, including clearing and land disturbance, is permitted" within this portion of the Property.

F. NOW, THEREFORE, in consideration of the foregoing, the covenants and agreements contained herein and other good and valuable consideration, the Grantor hereby grants, bargains, conveys, transfers and assigns to Grantee, its successors and assigns, in perpetuity, the conservation easements and restrictions described hereinafter on the Natural Area described in Schedule B.

DEFINITIONS:

The following terms shall have the following meanings when used herein, unless the context clearly requires otherwise. Terms defined in the singular shall have a correlative meaning when used in the plural and *vice versa*, and other inflected forms of such defined terms shall likewise have correlative meanings.

The term "**Baseline Documentation**" means an inventory report or other documentation cataloging the physical features, vegetation, condition of the Natural Area, condition and location of the Natural Area boundaries and access points, and other characteristics of the Natural Area, including but not limited to a USGS topographic map showing property lines and other nearby protected land; aerial photographs; on-site photographs showing resources protected, existing structures and improvements and other areas of concern; annotated survey plan or detailed property map including man-made features and approximate photo locations and perspectives; excerpt of soils map, showing property lines and soils productivity classifications; and a recorded copy of this Deed of Conservation Easement (submitted after closing). (Intended to satisfy Section 1.170A-14(g)(5) of the federal tax regulations.)

The term "**Conservation Values**" means all those natural, scenic, aesthetic, open space, ecological, plant and wildlife habitat, soil and water resource quality, watershed, wetland and similar features and values that characterize, or are or become associated with the Property.

The term "**Easement**" means this Deed of Conservation Easement.

The term "**hazardous or toxic substance**" means such elements, compounds and substances which pose a present or potential threat to human health, living organisms or the environment. They consist of all hazardous or toxic substances defined as such by the Department of Environmental Protection and the Environmental Protection Agency as of May 20, 1996 and any other substances defined as hazardous or toxic by the Department of Environmental Protection and the Environmental Protection Agency subsequent to May 20, 1996. See N.J.A.C. 7:50-2.11.

The term "**Natural Area**" means the portion of the Property that has been determined to contain critical habitat for threatened and endangered species and is described in Schedule B.

The term "**passive recreational activities**" means low-impact outdoor recreational pursuits that do not involve the use, placement, construction or installation of any structure or items of fixed or semi-fixed equipment, or result in any alteration of the land, other than those trail-related structures and surface alterations expressly permitted below. By way of example, and without limiting the generality of the foregoing, passive recreational activities shall not include such things as athletic fields, playgrounds, racquet courts, golf courses, skating rinks, tracks, sports stadiums, downhill ski runs and lifts, water parks, shooting ranges, and similar installations.

The term "**structure**" means any combination of materials to form a construction, fabrication, or any thing of human manufacture, for temporary or permanent occupancy, use or ornamentation, whether constructed on, above or below the surface of the land comprising the Property, including, but not limited to: (i) houses, cabins, mobile homes, trailers, barns, stables, sheds, silos, greenhouses, outhouses, cabanas, and other buildings and similar items of every kind and description, (ii) swimming pools, fences, docks, bridges, decks, satellite dishes and antennae, cellular telephone and other towers, billboards, signs, storage tanks and other accessory structures and fixed items of equipment; (iii) water, sewer, power, fuel and communication lines, other utility systems and related facilities; (iv) culverts, detention basins, and other stormwater or groundwater storage and control facilities; and (v) pads, patios, playing courts, riding rings, paddocks, corrals, pens, walkways, roads, driveways, parking areas and other areas constructed of or surfaced with wood, concrete, macadam, brick, paving stones, cinder block, gravel, clay, stone dust or other impervious or semi-pervious material.

The term **"Qualified Entity"** means a nonprofit organization, governmental body, or other legal entity legally qualified to be a holder of conservation easements in the State of New Jersey.

The terms "**wetlands**" and "**wetland areas**" mean wetlands as defined at N.J.A.C. 7:50 as those lands which are inundated or saturated by water at a magnitude, duration and frequency sufficient to support the growth of hydrophytes. Wetlands include lands with poorly drained or very poorly drained soils as designated by the National Cooperative Soils Survey of the Soil Conservation Service of the United States Department of Agriculture. Wetlands include coastal wetlands and inland wetlands, including submerged lands. The "New Jersey Pinelands Commission Manual for Identifying and Delineating Pinelands Area Wetlands: a Pinelands Supplement to the Federal Manual for Identifying and Delineating Jurisdictional Wetlands," dated January, 1991, as amended, may be utilized in delineating the extent of wetlands based on the definitions of wetlands and wetlands soils contained in this section, N.J.A.C. 7:50-2.11, 6.4 and 6.5. See N.J.A.C. 7:50-6.3.

PURPOSES:

The purposes of this Easement include, but are not limited to, the following:

(a) that the lands subject to this Easement be protected in their natural, scenic, open and existing state in perpetuity, subject only to the specific rights expressly reserved to the Grantor herein;

(b) that the natural features of the Natural Area and the Conservation Values associated with the Natural Area be respected and preserved to the maximum extent consistent with Grantor's exercise of the rights expressly reserved to Grantor by the terms of this Easement;

(c) that the Natural Area be forever protected and preserved in its natural, scenic and existing state free from all activities that might damage, compromise or interfere with its ecological diversity, natural beauty or resource quality, or with the natural processes occurring therein;

(d) that future uses of the Natural Area be confined to such activities as are not inconsistent with the said purposes or with the terms and conditions of this Easement.

GRANT OF PERPETUAL EASEMENT:

1. **Structures.** No structure or structures (as defined herein) shall be constructed, built, installed, placed, erected, assembled, manufactured, fabricated, altered, enlarged, renovated or replaced on, above or beneath the surface of the Property, except:

    (a) trail-related structures as provided in Paragraph 15.3;
    (b) signs as provided in Paragraph 15.3 and Paragraph 16.4; and/or
    (c) where existing structures require such maintenance or repair as is required to prevent a safety hazard, as approved by Grantee.

2. **Surface Alteration.** The surface topography and natural features of the Natural Area shall not be disturbed or altered, except if:

    (a) the same is reasonably necessary in order to carry out an activity expressly permitted by this Easement;
    (b) all proposed alterations are expressly reviewed and approved by Grantee; and
    (c) appropriate measures are taken to minimize and mitigate any adverse impacts on the Natural Area or the Conservation Values.

3. **Alteration of Wetlands.** No wetland area shall be drained, dredged, filled, diked, or otherwise disturbed except for such conservation and water quality improvement measures as Grantee may approve in writing, which approval shall be within Grantee's sole discretion.

4. **Alteration of Streams and Water Bodies.** The course, flow, size, quality, or other characteristics of streams, rivers, lakes or other water bodies located within the Natural Area shall not be altered or manipulated, except for such conservation and water quality improvement measures as Grantee may approve in writing, which approval shall be within Grantee's sole discretion.

5. **Cutting and Destruction of Vegetation.** Tree limbs, shrubs, native plants, vegetation or other plant material shall not be cut, destroyed or removed from the Natural Area, except that (a) dead, fallen, diseased or infected tree limbs or other vegetation that pose a health or safety hazard may be trimmed or removed, and (b) non-native vegetation may be controlled by physical means or through responsible application of herbicides and biological control measures in accordance with Paragraph 7.

6. **Invasive Plant Species.** No invasive or non-native species shall be planted within the Natural Area. Plantings within the Natural Area shall be approved by Grantee and shall be limited to native shrubs, trees and other vegetation which is adapted to the droughty, nutrient-poor conditions characteristic of the New Jersey Pinelands, as described at N.J.A.C. 7:50-6.21 et seq.

7. **Harmful Substances.** Substance(s), including, but not limited to fertilizers, herbicides, pesticides or fungicides, shall not be used on the Natural Area if such use would pose a threat of harm to any threatened or endangered plant or animal species or rare community type as identified by the New Jersey Natural Heritage Database or similar compendium,including, but not limited to, timber rattlesnakes and northern pine snakes.

8. **Refuse and Offensive Materials.** There shall be no processing, storage, disposal, spreading, placing or dumping of refuse, rubbish, debris, dredge spoil, chemicals, Hazardous Materials, animal waste, fertilizers or abandoned vehicles within the Natural Area.

9. **Motorized Vehicles.** No automobiles, trucks, all-terrain vehicles, trail bikes, motorcycles, snowmobiles or other motorized vehicles shall be used within theNatural Area except for emergency purposes.

10. **Commercial Uses.** No commercial or industrial uses shall be made of the Natural Area.

11. **Mining and Extraction.** No loam, peat, turf, soil, gravel, sand, coal, rock, minerals, petroleum, or natural gas, or other natural resource shall be mined, quarried, drilled, excavated, dredged, extracted or otherwise removed from the Natural Area.

12. **Other Activities.** No other activity shall be conducted on, or use made of, the Property or the Natural Area that is likely to have an adverse impact on the critical habitat for threatened/endangered species located on the Natural Area.

13. **Subdivision.** There shall be no partition, division or subdivision, legal or de facto, of the Property, or any portion thereof, into more than one ownership, including along any existing interior lot lines.

14. **Public Access.** Nothing contained herein shall be construed to convey to the public any right of access to or use of the Property, and the Grantor, for itself, its successors and assigns shall, subject to Paragraph 9 hereof, shall retain the exclusive right of access to and use of the Property.

15. **Grantor's Reserved Rights.** The prohibitions set forth herein notwithstanding, Grantor reserves the right to engage in those uses and activities described in this Article 15, subject to any and all conditions, limitations and restrictions imposed by law or by other applicable provisions of this Easement.

15.1 **Acts and Uses Not Otherwise Prohibited.** Grantor reserves all rights inherent in the ownership of the Property that are not prohibited by, or inconsistent with, the terms and purposes of, this Easement.

15.2 **Soil and Water Conservation or Habitat Restoration.** Grantor may engage in such soil and water conservation practices or habitat restoration projects within the Natural Area as may be necessary or appropriate, provided that such activities further the goals intended to be achieved by this Easement and protect the Conservation Values.

15.3 **Passive Recreational Activities.** Grantor may use and allow the Natural Area to be used for passive recreational activities (as defined herein), such as: nature study and observation, hiking, picnicking, cross-country skiing and hunting. Recreational activities other than passive recreational activities shall not be permitted. The scope and frequency of, number of participants in, and manner of carrying out such passive recreational activities shall be limited as necessary to ensure that they do not result in damage to, or degradation of, the Natural Area or the Conservation Values. In connection with, and to enhance and support, the foregoing permitted passive recreational activities, Grantor may:

(a) maintain existing trails, provided that no trail shall be improved with macadam, gravel, paving stones or other impervious or semi-pervious material, with the exception of designated handicap-accessible trails as approved by the Grantee;

(b) construct and maintain minor rustic boundary markers and trail markers;

(c) construct and maintain other trail-related improvements reasonably necessary for safe enjoyment of the Natural Area or the control of runoff or trail-related damage, such as: steps, bog bridges, erosion bars and railings and small unlighted informational and interpretive signs, provided that they shall be constructed of rustic natural colored materials that blend in with the natural surroundings and complement the natural and scenic features of the landscape; and

(d) install barriers and low fences where necessary to prevent use or access by motor vehicles or to protect fragile natural resources, provided that they shall be constructed of rustic natural colored materials that blend in with the natural surroundings and complement the natural and scenic features of the landscape.

16. **Rights of Grantee.** To accomplish the purposes of this Easement, the following rights are hereby conferred upon Grantee and its employees, agents and representatives.

16.1 **Access.** To have access to and enter upon the Natural Area at reasonable intervals for the purpose of inspecting the Natural Area to monitor compliance with and otherwise enforce the terms of this Easement, and to conduct scientific research and biological inventories including, if necessary, the right to enter upon and cross over other lands owned by Grantor, or over which Grantor has a right of ingress and egress; provided, however, that except in cases in which Grantee determines that immediate entry is required to prevent, terminate or mitigate any violation of this Easement, such entry

shall be upon prior reasonable notice to Grantor, and Grantee shall not unreasonably interfere with Grantor's use and quiet enjoyment of the Property.

16.2 **Protection of Conservation Values.** To protect and preserve the Conservation Values of the Natural Area (subject to the rights reserved to Grantor herein), and in connection therewith, to determine the consistency of any activity or use for which no express provision is made herein with the purposes of this Easement and the Conservation Values.

16.3 **Monitoring and Enforcement.** To enforce this Easement in the case of any breach or violation by Grantor or by third persons (whether or not claiming by, through, or under Grantor) by means of any remedy provided for herein or otherwise availableat law or in equity; to conduct regular biological and ecological monitoring activities with prior reasonable notice to Grantor; to require of Grantor or third persons the restoration of such areas or features of the Property as may be damaged by any inconsistent activity or use, and, if Grantor shall fail to do so and if Grantee shall so elect, to carry out reasonable and appropriate restoration activities on the Property following a violation of this Easement.

16.4 **Easement Signs.** To erect signs on the Natural Area indicating that the Natural Area is restricted by this Easement, identifying Grantee as the holder of this Easement, demarcating the location of the perimeter of the area covered by this Easement, and identifying various activities that are prohibited on the Property, which signs shall be approximately one (1) square foot in size and consistent in general design with those used by Grantee on other properties as to which Grantee has stewardship or management responsibilities.

17. **Enforcement.** This conservation restriction shall be fully enforceable by the Grantee, which is a special beneficiary of the conservation restriction, in an action at law or equity or both. Moreover, Grantee and its respective agents shall be permitted access to, and to enter upon Property at all reasonable times but solely for the purpose of scientific monitoring activities and inspection in order to enforce and assure compliance with the terms and conditions herein contained. Grantee agrees to give Grantor 24 hours advance notice of their intention to enter the Property, and further, to limit such times of entry to the daylight hours.

18. **Successors and Assigns.** This instrument shall be binding upon the Grantor, its successors and assigns.

19. **Future Instruments and Notice of Transfer.** This instrument shall be recorded in the Office of the Clerk of Ocean County and a reference to this instrument shall be contained in a separate paragraph of any future deed, lease, or document of transfer or conveyance affecting the Property described in Schedule A, of which the restricted portion is a part. Grantor shall give written notice to the Grantee of any such transfer or conveyance of interest in the Property described in Schedule A prior to or within ten (10) days following such transfer or conveyance. Such notice shall include the name and address of the Grantee of such interest. Grantor shall provide a copy of this instrument to all subsequent Grantees of a fee simple interest in any part or all of the Property. The failure of the Grantor to perform any act required by this Paragraph shall not impair the validity of this instrument or limit its enforceability in any way.

20. **Additional Monitoring and Enforcement Rights.** Grantee shall have the right to grant to the State of New Jersey Pinelands Commission or to any other governmental agency or Qualified Entity the power to

monitor and/or enforce any or all of the terms and conditions of this Easement in the same manner and to the same extent as could be done by Grantee.

21. **Schedules & Exhibits**. The following schedules and exhibits are annexed to and shall form a part of this Easement:

Schedule A:	Description of the Property
Schedule B:	Description of the Natural Area
Schedule C:	Baseline Documentation
Exhibit 1:	Drawing depicting the Property and the Natural Area

IN WITNESS WHEREOF, and intending to be legally bound, the GRANTOR has executed this indenture.

By: _____ By: _____
Witness GRANTOR

By: _____
GRANTOR

STATE OF NEW JERSEY, COUNTY OF OCEAN:

I CERTIFY that on _____, 200___, _____ personally came before me and acknowledged under oath, to my satisfaction that this person (or if more than one, each person):

(a) is named in and personally signed this document; and
(b) signed, sealed and delivered this document at his or her act and deed; and
(c) this transfer is made for no monetary consideration

Signed and Sworn to before me on _____, 200___

_____ _____
(Print name of attesting witness below signature)

APPENDIX D.
THREATENED & ENDANGERED SPECIES SURVEYS: RECOMMENDED APPROACH FOR PROPOSED ZONING

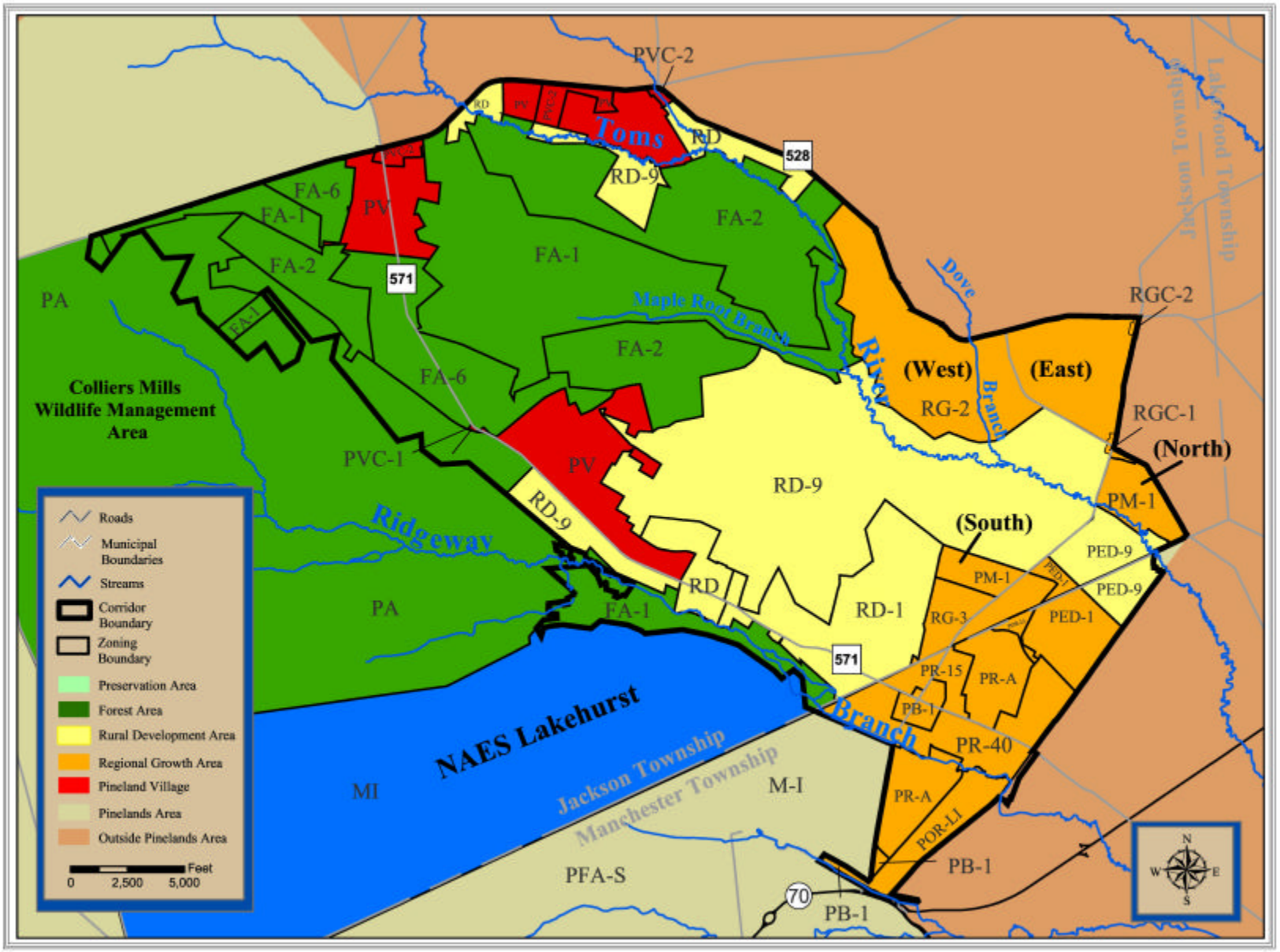


Figure 20. Toms River Corridor Pinelands Management Areas Associated with T&E Species Survey Requirements

APPENDIX D.

THREATENED & ENDANGERED SPECIES SURVEYS: RECOMMENDED APPROACH FOR PROPOSED ZONING

Zone (see Figure 19)	Zone Density	Single Family Infill (SFI) Development - Development limited to single-family dwelling within 300 feet of a preexisting public road or residential, commercial or industrial development - May contain a driveway no longer than 300 feet - Total area to be permanently disturbed ½ acre or less - Remaining undeveloped portion of the property will be deed-restricted	Development other than Single Family Infill	
			Clustered Residential	Non-clustered Residential AND Non-residential (Commercial, Industrial, etc.)
FA-1*	1 du/70 ac [MANDATORY CLUSTERING]	NO SURVEY (routine Commission staff site visit)**	HA (Habitat Assessment to select development area) and FS2 (Full Survey of development area +300')	FS1 (Full Survey of entire parcel)
FA-2*	1 du/32 ac [MANDATORY CLUSTERING]	NO SURVEY (routine Commission staff site visit)**	HA and FS2	FS1
FA-6	1 du/6 ac [MANDATORY CLUSTERING]	NO SURVEY (routine Commission staff site visit)**	HA and FS2	FS1
RD-9	1 du/9 ac [MANDATORY CLUSTERING]	NO SURVEY (routine Commission staff site visit)**	HA and FS2	FS1

***** The subcommittee recommends that in the FA-1 and FA-2 zones, development be limited to SFI. However, if the Township desires additional flexibility, certain uses should only be permitted as a conditional use subject to certain conditions, e.g., a maximum lot clearing limit (e.g., 5% of lot acreage), deed restriction on the remainder of the parcel, etc.

** If strong evidence of T/E species is found during a routine Commission staff site visit, either 1) development footprint must be moved; or 2) 1-day consultant visual survey must be completed.

NOTE: Surveys are to be conducted during appropriate species-specific season.

Zone (see Figure 19)	Zone Density	Single Family Infill (SFI) Development - Development limited to single-family dwelling within 300 feet of a preexisting public road or residential, commercial or industrial development - May contain a driveway no longer than 300 feet - Total area to be permanently disturbed ½ acre or less - Remaining undeveloped portion of the property will be deed-restricted	Development other than Single Family Infill	
			Clustered Residential	Non-clustered Residential AND Non-residential (Commercial, Industrial, etc.)
RD-3.8	1 du/3.8 ac [MANDATORY CLUSTERING]	NO SURVEY (routine Commission staff site visit)**	HA and FS2	FS1
RD-1	1 du/1 ac	NO SURVEY (routine Commission staff site visit)**	NO SURVEY (routine Commission staff site visit)**	NO SURVEY (routine Commission staff site visit)**
PV	1du/1 ac	NO SURVEY (routine Commission staff site visit)**	NO SURVEY (routine Commission staff site visit)**	NO SURVEY (routine Commission staff site visit)**
PED-9 (RDA)	1du/9 ac [MANDATORY CLUSTERING]	NO SURVEY (routine Commission staff site visit)**	FS1	FS1
PED-1 (RGA)	1-3 du/ac	NO SURVEY (routine Commission staff site visit)**	NO SURVEY (routine Commission staff site visit)**	NO SURVEY (routine Commission staff site visit)**

** If strong evidence of T/E species is found during a routine Commission staff site visit, either 1) development footprint must be moved; or 2) 1-day consultant visual survey must be completed.

NOTE: Surveys are to be conducted during appropriate species-specific season.

Zone (see Figure 19)	Zone Density	Single Family Infill (SFI) Development - Development limited to single-family dwelling within 300 feet of a preexisting public road or residential, commercial or industrial development - May contain a driveway no longer than 300 feet - Total area to be permanently disturbed ½ acre or less - Remaining undeveloped portion of the property will be deed-restricted	Development other than Single Family Infill	
			Clustered Residential	Non-clustered Residential AND Non-residential (Commercial, Industrial, etc.)
PM1 (Jackson – South)	n/a (non-residential)	n/a	n/a	NO SURVEY (routine Commission staff site visit)**
PM1 (Jackson – North)	n/a (non-residential)	n/a	n/a	HA and FS2
Jackson RGA-3	1 du/0.4 acre (with ability to increase to 1 du/0.22 acre using PDCs)	NO SURVEY (routine Commission staff site visit)**	NO SURVEY (routine Commission staff site visit)**	NO SURVEY (routine Commission staff site visit)**
Jackson RGA-2 (West side of Dove Mill Branch)	1 du/0.5 acre (with ability to increase to 1du/0.33 acre using PDCs)	NO SURVEY (routine Commission staff site visit)**	HA and FS2	FS1

** If strong evidence of T/E species is found during a routine Commission staff site visit, either 1) development footprint must be moved; or 2) 1-day consultant visual survey must be completed.

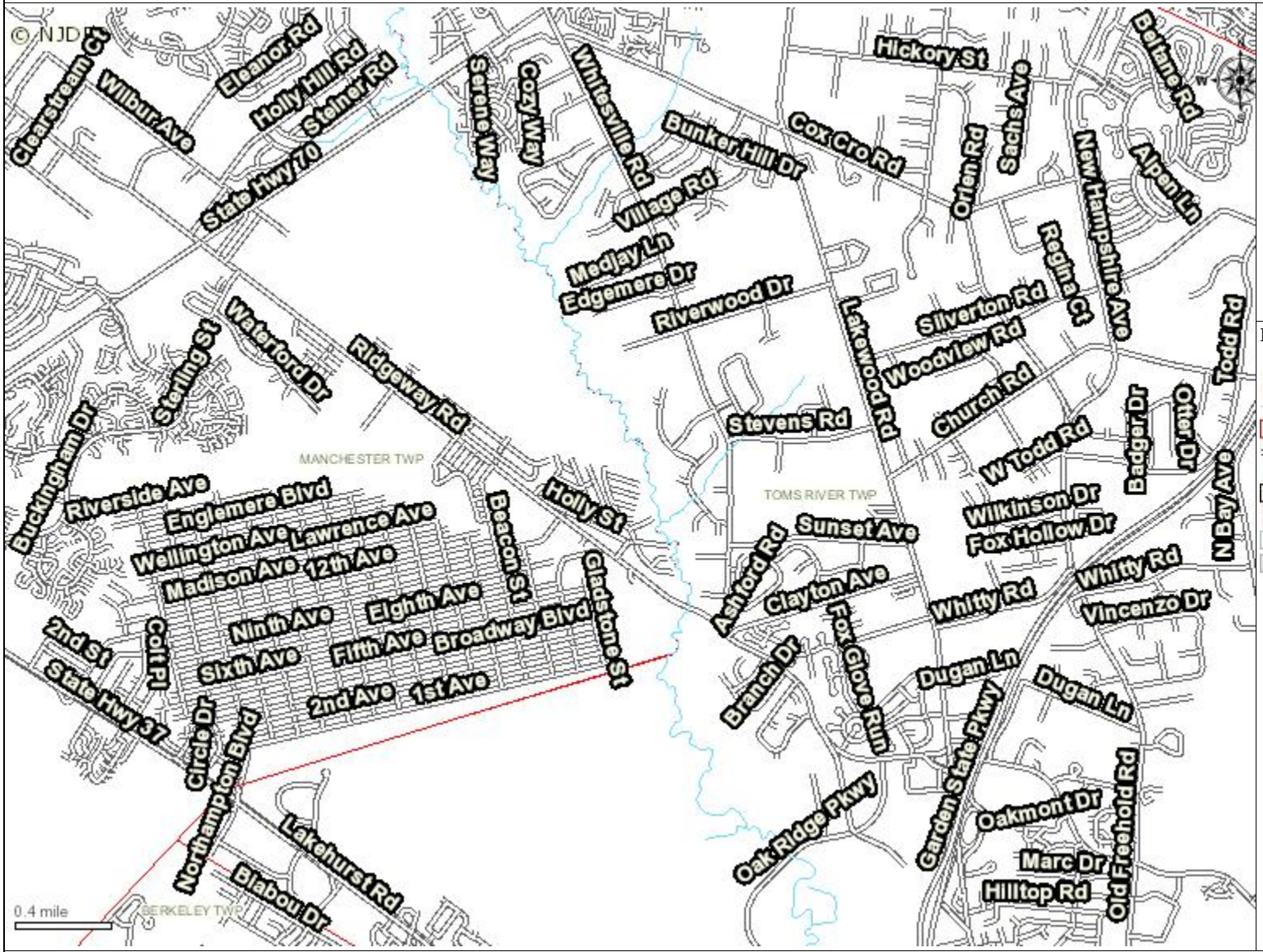
NOTE: Surveys are to be conducted during appropriate species-specific season.

Zone (see Figure 19)	Zone Density	Single Family Infill (SFI) Development - Development limited to single-family dwelling within 300 feet of a preexisting public road or residential, commercial or industrial development - May contain a driveway no longer than 300 feet - Total area to be permanently disturbed ½ acre or less - Remaining undeveloped portion of the property will be deed-restricted	Development other than Single Family Infill	
			Clustered Residential	Non-clustered Residential AND Non-residential (Commercial, Industrial, etc.)
Jackson RGA-2 (East side of Dove Mill Branch)	1 du/0.5 acre (with ability to increase to 1 du/0.33 acre using PDCs)	NO SURVEY (routine Commission staff site visit)**	NO SURVEY (routine Commission staff site visit)**	NO SURVEY (routine Commission staff site visit)**
Remaining Manchester Growth Area (PB-1, PR-A, PR-15, PR-40, POR-LI)		NO SURVEY (routine Commission staff site visit)**	NO SURVEY (routine Commission staff site visit)**	NO SURVEY (routine Commission staff site visit)**

** If strong evidence of T/E species is found during a routine Commission staff site visit, either 1) development footprint must be moved; or 2) 1-day consultant visual survey must be completed.

NOTE: Surveys are to be conducted during appropriate species-specific season.

C1 Stream in Manchester Toms River area



Legend

GeoWeb
- Category One Waters
- Municipalities
- Roads NJ (Centerlines) (1:50000 to 1:5000 scale)
- Counties

Mid-Atlantic States
- New Jersey
- Other Mid-Atlantic States

Map Printed On {2015-05-20 12:21}