March 2007










Natural Resource Inventory

for

Holland Township

Hunterdon County, NJ

Prepared for:

Holland Township

Environmental Commission

Kratzer Environmental Services

Written by:

Deborah J. Kratzer

NATURAL RESOURCE INVENTORY

The Township of Holland

Hunterdon County

New Jersey

Researched, Written and Prepared

By

Deborah J. Kratzer, Kratzer Environmental Services

For

The Holland Township Environmental Commission

March 2007

Funded by Holland Township and a grant from anjec
(The Association of New Jersey Environmental Commissions)

Kratzer Environmental Services

Deborah J. Kratzer
19 Hill Road
Frenchtown, NJ 08825
908-996-2576
kratzers@intergate.com

"We should act like this is the only planet we have because it is." (Honachevsky, 2000)

Acknowledgements

This report was authored by Deborah J. Kratzer. Todd Kratzer provided the surface water quality data and analysis. Thanks go to Peter Craig for many of the photographs used in the report; and to Peter Craig and David Grossmueller for providing copies of various reports used as references for this report and for consultation and review.

Photo credits:

Section	Page	Description	Photo Credit
Cover:		Farm; Delaware River; grass; garden gate; Delaware River	Peter Craig
		Damselfly; Hakihokake Creek	Christopher T. Kratzer
		Cactus,; wood turtle; creek in Musconetcong Gorge	Deborah J. Kratzer
1	9	Two aerial views of Holland Township	Peter Craig
2	15	Two photos, Delaware River flood April 2005	Peter Craig
3	30-31	Three photos of geology	Deborah J. Kratzer
6	78	Delaware River looking south from fishing access just below Riegelsville Bridge	Deborah J. Kratzer
	82	New York Ironweed with Black swallowtail butterfly	Deborah J. Kratzer
	89	Hakihokake Creek	Christopher T. Kratzer
	89	Delaware River at Gilbert Station; Hughesville paper plant	Peter Craig
	92	Stream bank erosion	Peter Craig
	100	Damselfly at Hakihokake Creek	Christopher T. Kratzer
7	108	Alexandria Farm	Peter Craig
	113	Northern grey tree frog; spotted salamander larvae	Deborah J. Kratzer
	116	wood turtle	Deborah J. Kratzer
	120	prickly pear cactus on Milford Bluffs	Peter Craig
8	134	Alexandria Farm	Peter Craig
	135	Musconetcong River Reservation	Deborah J. Kratzer
	136	Aerial view of Holland Township	Peter Craig
	139	Aerial view of Bunn Valley; Hoffman Farm, Bunn Valley	Peter Craig
9	142	Lime kiln, Bunn Valley	Peter Craig
	143	Galloway Farmhouse; Boss Farmhouse	Peter Craig

Table of Contents

Preface

It is with great pleasure and pride that we dedicate this document to the citizens of Holland Township. Our previous environmental inventory was done 30 years ago, to standards current at the time but quite inadequate for the present day. Every one of us in the Township is indebted to Deborah Kratzer, the author of the report, for a job superbly done.

Before delving into this very comprehensive compilation, the reader should understand what it is, and what limits it may have.

First, this NRI is a wide-ranging catalog of *available information* about the natural features of Holland Township. The information and data banks to which we have access vary greatly in age, quantity and quality. Most environmental data are gathered, interpreted and maintained by the federal and state governments, and that information is the basis for most of what is contained here. From the local standpoint, it is immensely valuable to be able to see in concrete form what those bureaucracies know, or think they know, about Holland Township. However, the careful and locally knowledgeable reader of this document will doubtless be able to find errors and omissions. Identifying and correcting inadequate but significant information needs to one of our most important near-term goals.

Second, this document lays out the highly specific dimensions of the natural environment. Most of us have pretty diffuse ideas about what the environment really is. For many, it is simply the opposite end of the spectrum from heavy traffic, crowding throngs and incessant noise; it is the forested flank of the mountain, or the calm pastoral scene. But the natural environment is far more than that: climate, topography and geology, fields and forests, soils, ground and surface waters, and the thousands of spontaneously propagating species of plant and animal that depend for their very existence upon the qualities of the lands and waters they occupy. This document fills in the specific details in the environmental portrait of the Township. The accompanying photographs illuminate the transcendent beauty of the face of our piece of New Jersey.

Third, these pages provide Township-related information in a single source, on a scope that is a first in the history of this municipality. Digital technology has completely changed the way information is collected and stored. In the seventies, natural features were drawn on clear acetate sheets with colored pens. Now computers, geographic information systems (GIS), and the internet have increased the quantity and complexity of available data by orders of magnitude. This Inventory offers not only a vast goldmine of details and maps, but also gives a full set of references by which the enterprising reader can gain access to original sources.

We believe profoundly that a landowner's deed of record not only establishes his legal domain over a parcel of land, but also implies his responsibility for stewardship of that land. This document reminds us of our responsibilities to our neighbors downstream and downwind, to those with whom we share access to clean waters in streams and in the bedrock below, and to the many other plant and animal species with which we share the surface of the planet. This document reminds us that when we are gone, and when our sons and daughters are gone, these lands will remain. What they will be like is, in many ways, up to us.

Therein lies the primary usefulness of a Natural Resource Inventory. The reader will note that a lot of the information contained here relates to human-oriented features not usually thought of as "natural". Good planning for the future requires, above all things, a sense of balance and purpose. This NRI raises the curtain and sets the stage upon which our efforts to achieve that balance can include due consideration of the environment we cherish.

2006 Holland Township Environmental Commission

Edith Kozak, Chairperson	David Grossmueller
Maria Elena Jennette Kozak	Walter Jenness
Dick Grogan	Ed Burdzy (former member)

March 2007

1: INTRODUCTION

A. Ecologically Based Planning

Ecology is defined as the science of the relationships between organisms and their environments. The relationships between and among the physical factors of the environment, including the air, geology, topography, soils, and water, and the biotic environment, including plants, animals and decomposers, are a complex web. Humans are a significant part of the ecosystem of Holland Township, both affecting and being affected by many physical and biological factors. Even in Holland, with a relatively low human density of 213.5 people per square mile (2000 census), the cumulative effects of many individual decisions have the potential to alter the environment in ways that cause harm directly to human health, and indirectly through complex environmental functions.

William Honachefsky, in his book Ecologically Based Municipal Land Use Planning, states,

> "The scientific community needs to articulate more clearly for local decision makers the underlying ecological processes and the consequences resulting from interference or truncation of those processes." (Honachefsky, 2000, p. 32)

Assembling an inventory of the township's ecological infrastructure is the first step in a proactive and ecological approach to protecting and preserving human and ecological health. Analyzing the data, gaining an understanding of the ecological processes involved, and considering the consequences of ignoring them, will help local land planners create an ecologically healthy community.

B. Goal of the Natural Resource Inventory

The Municipal Land Use Law requires municipalities' Master Plans to have a land use plan including, but not necessarily limited to, topography, soil conditions, water supply, flood plains, wetlands, and woodlands (Municipal Land Use Law, 2002).

The Environmental Commission Enabling Legislation gives environmental commissions the authority to conduct such research for inclusion in the Master Plan, and then to use this information to help evaluate development applications.

The Association of New Jersey Environmental Commissions (ANJEC) defines "Environmental Resource Inventory" in its Resource Paper, The Environmental Resource Inventory: ERI, as follows:

> "The Environmental Resource Inventory (ERI), also called Natural Resource Inventory (NRI), or Index of Natural Resources, is a compilation of text and visual information about the natural resource characteristics and environmental features of an area. An ERI is an unbiased report of integrated data. It provides baseline documentation for measuring and evaluating resource protection issues. The ERI is an objective listing, rather than an interpretation or recommendation. Identifying significant environmental resources is the first step in their protection and preservation." (ANJEC, no date).

The goal of the NRI is to provide a planning tool containing resource information, data and maps that can be used as part of the Master Plan, as a reference when reviewing development proposals, and as a guide in other township activities in order to better protect the township's natural resources and the overall health and welfare of the community.

The NRI will principally be used by the Planning Board, Board of Adjustment and Environmental Commission, but will provide valuable information to anyone interested in the natural resources of Holland Township. Ideally, landowners considering subdivision and development will become familiar with the environmental concerns specific to their property, and thereby have the ability to make resource-sensitive development decisions. Even when subdivision is not an issue, residents may learn to appreciate and maintain our valuable natural resources. Areas of specific concern may emerge which require additional protection strategies, such as further research and monitoring, public outreach and education, habitat restoration, easements, volunteer projects, and/or revised or new ordinances.

Holland's 1978 Natural Resources Inventory summarized the goal as follows:

> "In solving planning problems as they relate to natural resources, the key goal to keep in mind is: To properly manage each of the natural resource factors affected by the proposal. If this is consistently done, no matter what the final density or character of a community it should be an environmentally healthy one at least in-so-far as it relates to the carrying capacity of the natural resources identified" (South Branch Watershed Association, 1978).

C. Methods

In 1978, Holland Township compiled a Natural Resources Inventory (NRI) (South Branch Watershed Association). Volume I of the NRI consisted of three chapters; Chapter 1 addressed 17 key land use planning issues and recommended a problem solving process, strategies and a legislative program with which to address them; Chapter 2 explained a method for using the mapped information (i.e. how to manually enlarge maps); and Chapter 3 presented the natural resource inventory data. Volume II presented 11 model ordinances, while Volume III compiled a technical reference library used as a basis for many of the findings, conclusions and recommendations of the NRI.

Much has changed in the ensuing 25+ years, including approximately a 12% population increase, changes and updates of data and information, the enactment of the Highlands Legislation, National Wild and Scenic designation of the Delaware River, and state designation of additional Category 1 (antidegradation) classified streams. Perhaps the most important change has been the availability of computerized map software and data. The use of computerized mapping (known as Geographic Information Systems, or GIS) provides a powerful tool to aid visualization of the distribution and inter-relationships of resources and physical characteristics, and biological importance of a site. Using the GIS files created as part of this report, an individual with some training in the use of ArcView GIS software can further customize maps (such as for a site proposed for development) whenever needed.

The most recent Holland Township Master Plan (McKenzie, 2001)

includes *Background Studies* (Regional Location, Existing Land Use, Physical Characteristics and Utilities Service), *Master Plan Elements* (Goals and Objectives, Land Use Plan Element, Farmland Preservation Plan Element and Regional Consistency), and four *Appendices* (Historic Sites, Woodward-Clyde Tables and Geological Map from 1978 Natural Resource Inventory, Hunterdon County Population, Housing and Employment Estimates and List of Qualified Farmland Properties). In addition, a Groundwater Resource Evaluation was completed in 2004 by Demicco and Associates, Inc.

In order to integrate the above changes into a new Natural Resource Inventory report, and to assemble an up-to-date GIS data set, funding for the project was obtained from a grant from the Association of New Jersey Environmental Commissions (ANJEC), with 50% cost share provided by Holland Township. Holland Township hired Kratzer Environmental Services to develop its NRI.

An inventory of what is currently known about the physical and biotic environment and the human influence on the environment of Holland Township has been compiled for this document. Information sources include the 1978 Natural Resource Inventory, the 2001 Holland Township Master Plan, and the 2004 Groundwater Resources Evaluation.

Further sources include the internet; and federal, state, county and local databases and contacts. The most current GIS data has been obtained from the New Jersey Department of Environmental Protection GIS Data Web Site and other sources (see **Appendix A** and **Appendix B**).

All digital inventory data used in this report will be provided to the Holland Township Environmental Commission. The Holland Township Environmental Commission obtained the most updated GIS software ArcView 9.1, from the New Jersey Department of Environmental Protection, which provides free copies of this software to townships on the condition that township representatives receive training and the software is actively used. The public can also use GIS data by using either the New Jersey Department of Environmental Protection's i-MapNJ website or obtain relevant data layers (most are free on the internet), and download the free software, ArcExplorer (see **Internet Resources**, below) to view the data.

References and related print and Internet resources are listed at the end of each section, so that readers may find more information and updates. Please note that Internet sites may change or be temporarily out of service. If an Internet link doesn't work, try the first part of the address. If that works, you may be able to search for the type of information you want. For example, if you click on http://www.state.nj.us/dep/gis/downloadintra.html and the site no longer exists, try http://www.state.nj.us/dep/gis/ ; if that doesn't work, try http://www.state.nj.us/dep/ .

A Geographic Information System (GIS) is computerized mapping which combines layers of information about a place to provide a better understanding of that place.

D. Limitations of the NRI

It should be noted that the NRI is not intended to produce original research and is not meant to replace the primary data sources upon which it is based. It is intended for preliminary assessments of projects and *cannot substitute for on-site testing and evaluations*. Most maps are presented at a scale of 1:49,200 in order to fit on 8.5 x11 inch paper. "Zooming in" to better view individual lots is possible, but should not exceed the scale at which the data was created. Most data layers used for this report were created at 1:24,000 scale (with an accuracy of $\pm$ 40 feet). Data

mapped at 1:100,000, such as the geology data layer, have an accuracy of ± 166.7 feet (Garie, 1998).

Sometimes mapped features don't line up exactly, since different data producers may have used different methods of acquiring and analyzing the data, used different scales or coordinate systems, and because of differences or errors in the base data.

GIS data from NJDEP and Hunterdon County are used with permission (see the Terms of Agreement in **Appendix A**), with the required "disclaimer" printed on each map which uses their data: "This map was developed using [NJDEP and/or Hunterdon County] GIS digital data, but this secondary product has not been verified by [NJDEP or Hunterdon County] and is not [NJDEP- or county-] authorized." **Appendix B** provides details of the GIS data used for this report, and where the data may be obtained.

Some components of the environment may have been studied or presented in detail, while other important factors may have been minimally addressed. When new or updated information becomes available, or new issues emerge, *updates should be appended to the NRI.*

Management recommendations are beyond the scope of the NRI.

E. General Description of Holland Township

Holland Township was separated from Alexandria Township in 1874. In 1876 it was remerged with Alexandria Township and separated as a municipality of its own again in 1879 (Hunterdon County website, 2006). Holland Township is located in the northwesterly corner of Hunterdon County, NJ (see **Figure 1a**). The Township's northwestern border is formed by the Musconetcong River, which separates Holland from Warren County (Pohatcong Township). Holland is also bordered by Bethlehem Township, Alexandria Township, and Milford Boro. To the south and west, the Township is bounded by the Delaware River. Holland Township encompasses 22.7 square miles (14,528 acres) with a population of 5,124 living in 1,942 housing units (2000 census). The Delaware River is designated as part of the National Wild and Scenic River System. The Musconetcong River has been proposed for inclusion, and may receive wild and scenic designation in the near future.

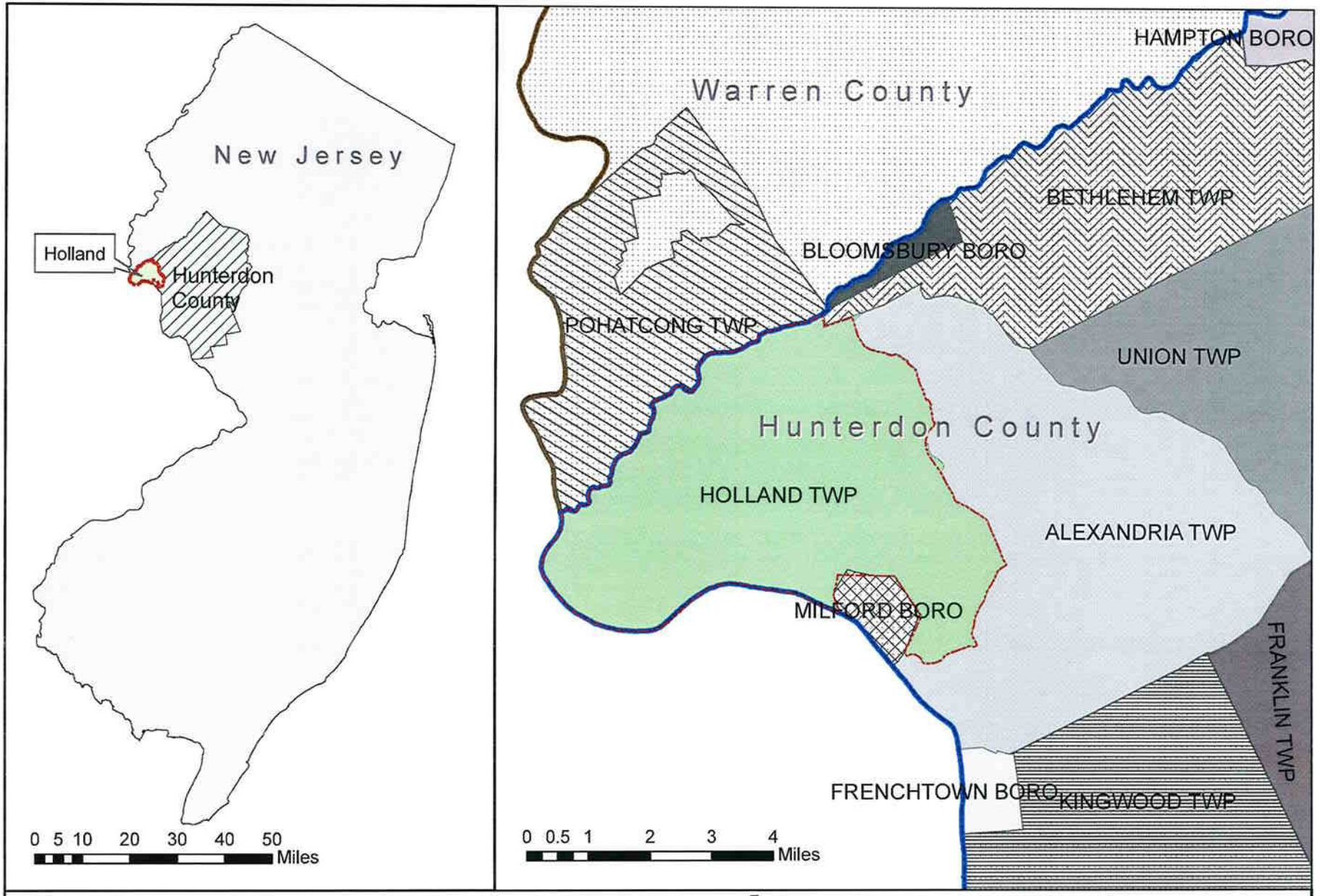
The township is predominantly a rural municipality (see **Table 1**), relying largely on individual water supply wells and on-site septic systems, with some areas served by public water and sewer. Commercial development is mostly centered along County Route 519. **Figure 1b** shows aerial photographs of Holland and the surrounding areas taken in 2002[1]. To provide an overview of the township, **Figure 1c** displays named places, roads and tax parcels, while **Figure 1d** shows parcels grouped by block.

Table 1: Land Use Type Relative Area in Holland

Land Use Type	1995 Percentage	2002 Percentage
AGRICULTURE	31.0	27.7
BARREN LAND	0.1	0.5
FOREST	47.3	42.7
URBAN	14.2	20.3
WATER	2.2	1.9
WETLANDS	5.2	6.9
Grand Total	100%	100%
Sources: 1995 and 2002 Land Use/Land Cover GIS data.		

Holland contains a wealth of natural and historic resources and has preserved some farmland and open space, funded by a portion of the local tax assessment and other sources.

[1] For the aerial photography, much more detail can be seen when the data is viewed at a larger scale than that used in this report (the 2002 data has pixels of 1 square foot; the 1995 data, in contrast, has pixels of 1 square meter). Inset pictures show examples of what level of detail is available.



Data Sources: See Appendix B.
Note: Map accuracy is limited to the accuracy and scale of the original data sets; see Appendix B.
Disclaimer: This map was developed using NJDEP and Hunterdon County GIS digital data, but this secondary product has not been verified by NJDEP or Hunterdon County and is not NJDEP or county authorized.

Holland Township NRI, 2007
Prepared by Kratzer Environmental Services

Figure 1a: Location of Holland Township, Hunterdon County, NJ

Examples of detail available:

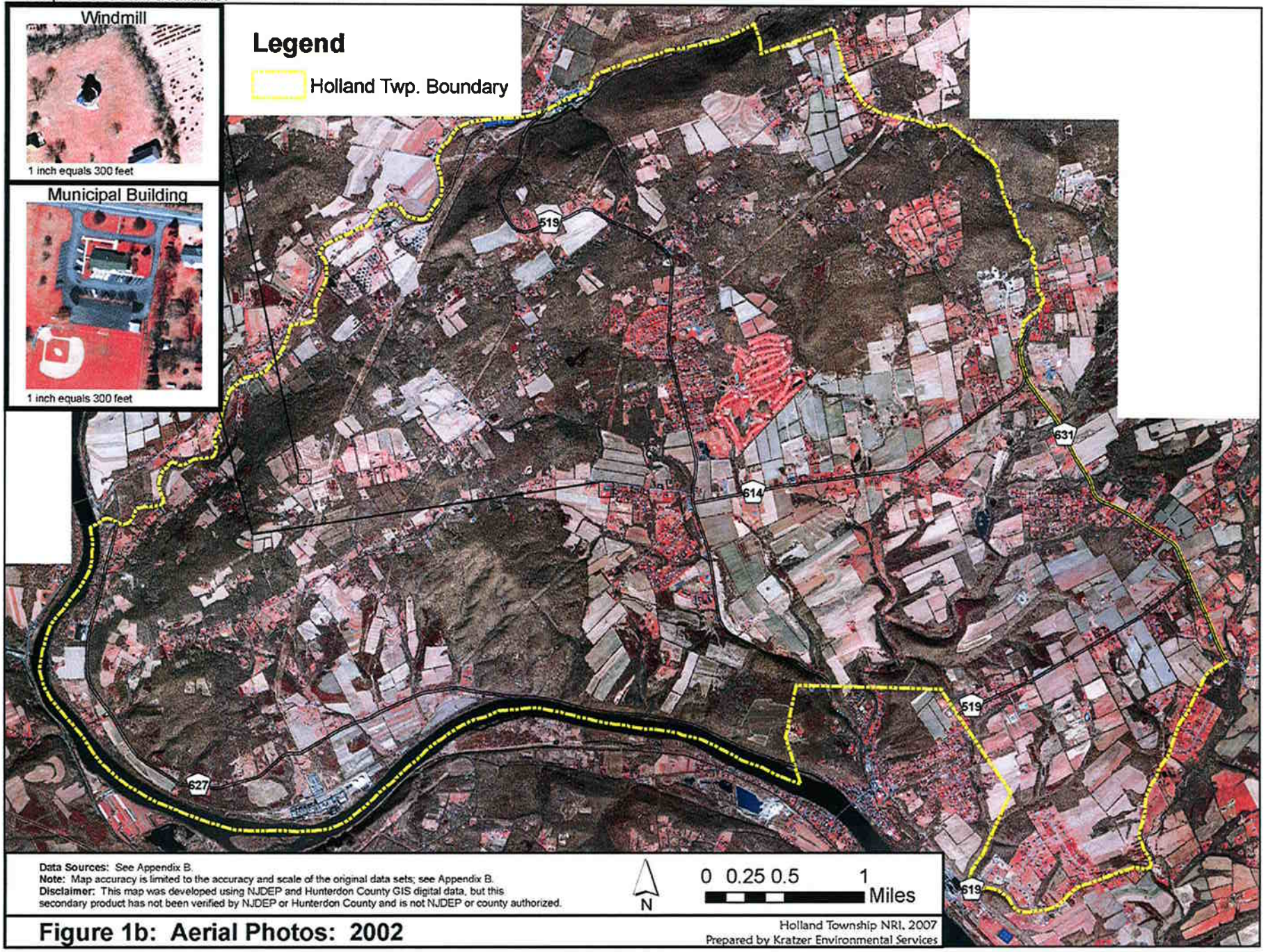


Figure 1b: Aerial Photos: 2002

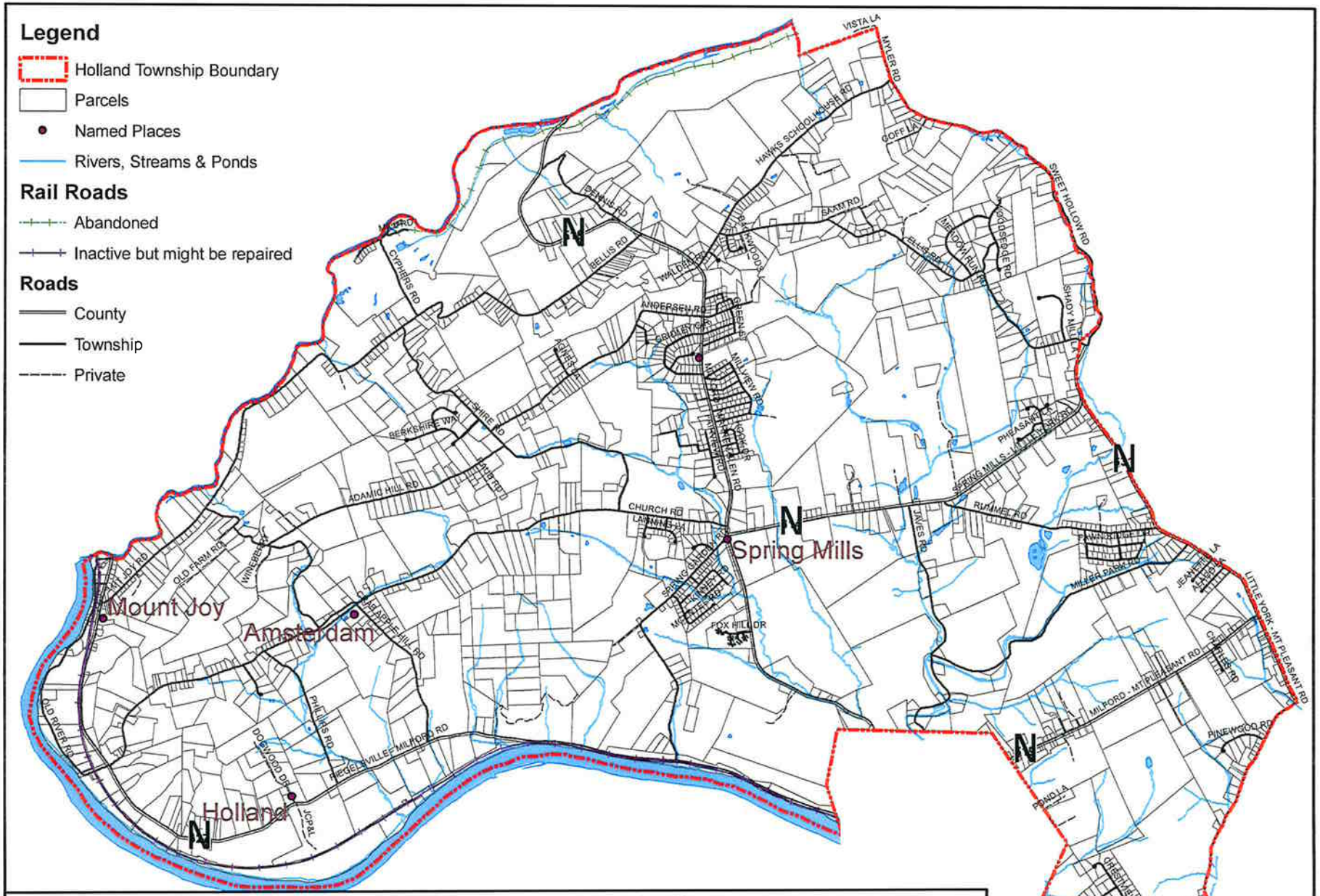


Figure 1c: Named Places, Roads and Railroads

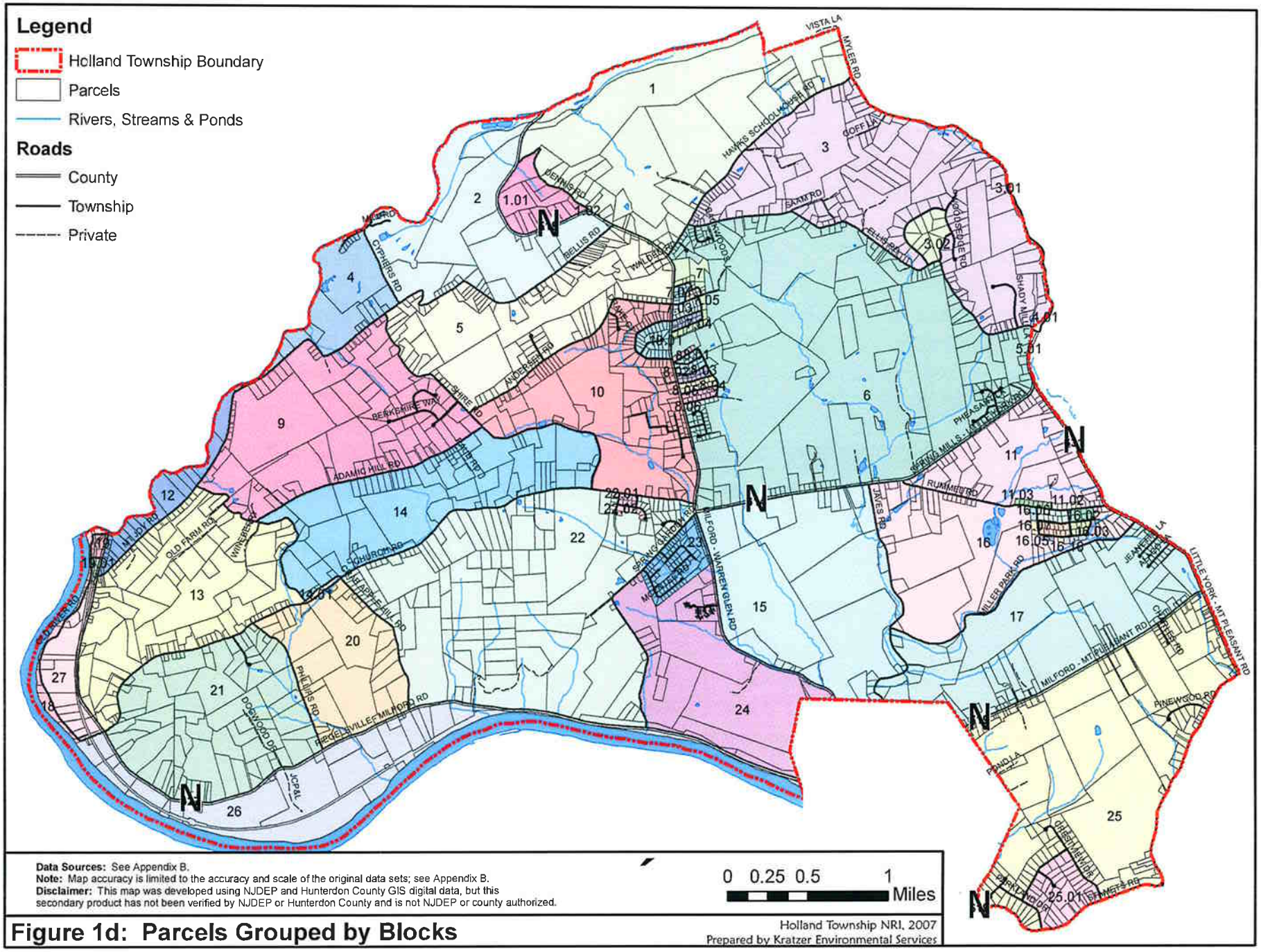


Figure 1d: Parcels Grouped by Blocks

Musconetcong Mountain in Holland Township

Fueled by the general trend toward suburban sprawl, added to the desirable characteristics of the township, such as its rural character, the township is experiencing minimal development pressure. NJDEP used the 2002 aerial photographs to determine land use, shown in **Figure 1e**. During recent years, common changes of land use in Holland include a change from agriculture to urban (residential) use; from forest to urban (residential) use; and various changes to wetlands. The map does not show changes that have occurred since the aerial photos were taken in 2002, nor does it reflect any anticipated changes due to approved subdivisions.

Despite the township's relatively secluded location and bucolic atmosphere, it is influenced by the same variety of environmental issues confronting the region as a whole. Suburban sprawl results in ecological impacts such as further loss of farmland, forests, wetlands, habitat and an increase in impervious surfaces, erosion, pollution, human/wildlife conflicts and the local eradication of species. When fields are allowed to lie fallow, aggressive exotic vegetation, such as multiflora rose, and excessive browsing by deer prevent the normal succession to forest growth. Holland Township is the site of a several point sources of pollution, such as Fibermark and Gilbert Generating Station; and potential nonpoint sources of pollution, such as storm drains, farms and lawns. In addition, Holland's geology supports a limited water supply that is vulnerable to quantity and quality degradation. These environmental concerns are addressed in detail in the following chapters.

Land use in Holland Township is a mixture of agriculture, forests, residential and a golf course.

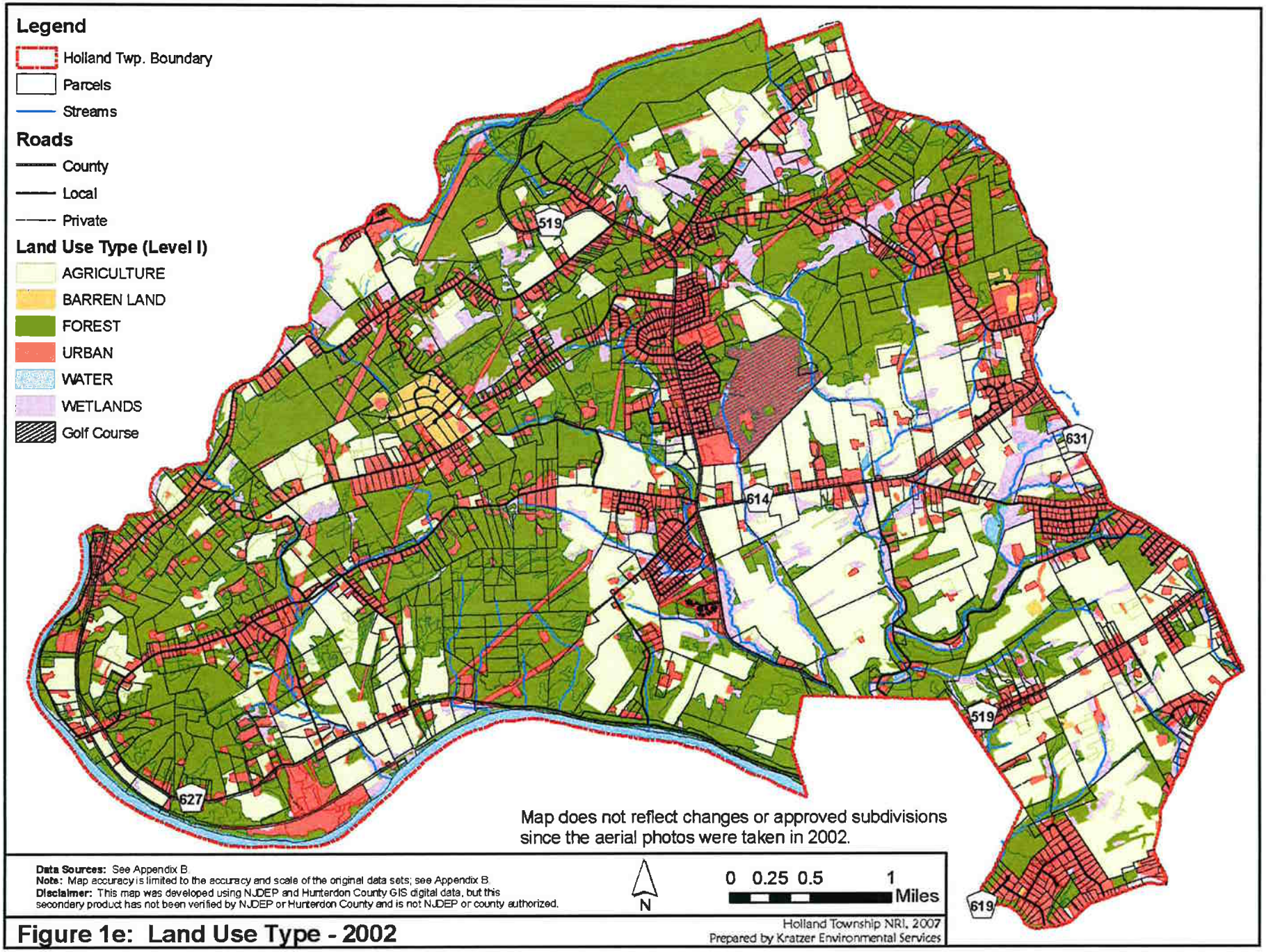


Figure 1e: Land Use Type - 2002

References: Introduction

Association of New Jersey Environmental Commissions (ANJEC). The Environmental Resource Inventory: ERI. ANJEC; Mendam, NJ. 12 pages.

Demicco and Associates, Inc. 2004. Groundwater Resource Evaluation of Holland Township, Hunterdon County, NJ. Prepared for Holland Township Planning Board. 89 pages.

Garie, Henry L. and Lawrence L. Thornton. September 1998. New Jersey State Agency Partnership GIS Technical Mapping Standards: Enhancing GIS Technology for Multi-Agency Cooperation. Standards Subcommittee State Mapping Advisory Committee: Trenton, NJ.

Honachefsky, William B. 2000. Ecologically Based Municipal Land Use Planning. Lewis Publishers: New York. 255 pages.

Hunterdon County website, Holland Township. 2006. http://www.co.hunterdon.nj.us/mun/holland.htm

Lower Delaware River Wild and Scenic River Study Task Force. August 1997. Lower Delaware River Management Plan. 106 pages.

McKenzie, Elizabeth C. 2001. Master Plan for Holland Township, Hunterdon County, NJ. Adopted by the Planning Board May 14, 2001.

Municipal Land Use Law Chapter 291 Laws of N.J. 1975. NJ Statutes Annotated compiled as 40:55D-1 et. seq. with amendments through the 209th State Legislature, January 2002. http://njpo.org

South Branch Watershed Association. A Natural Resource Inventory: Holland Township, Hunterdon County. 1978. Commissioned by the Environmental Commission of Holland Township. Three volumes.

US Census Bureau website. 2006.
http://factfinder.census.gov/servlet/SAFFFacts?_event=Search&geo_id=&_geoContext=&_street=&_county=Holland&_cityTown=Holland&_state=04000US34&_zip=&_lang=en&_sse=on&pctxt=fph&pgsl=010

Internet Resources: Introduction

Environmental Education

NJDEP SEEDS: The State Environmental Education Directory Website:
http://www.state.nj.us/dep/seeds/index.html

Free GIS Software and Publications

Esri Free Stuff Home Page: http://www.esri.com/company/free.html#software
ArcExplorer (free GIS software): http://www.esri.com/software/arcexplorer/index.html

GIS Maps for New Jersey on the Internet

i-MapNJ (an on-line environmental mapping tool): http://www.state.nj.us/dep/gis/imapnj/imapnj.htm

GIS Data from New Jersey Department of Environmental Protection
(For a complete list of data sources used in this report, see **Appendix B.**)

NJ GIS Home Page: http://www.state.nj.us/dep/gis/index.html

Download GIS data: http://www.state.nj.us/dep/gis/downloadintra.html

NJ Geographic Information Network: https://njgin.state.nj.us/NJ_NJGINExplorer/index.jsp

Holland Township's Official Home Page: http://hollandtownship.org/

Hunterdon County's Official Home Page: http://www.co.hunterdon.nj.us/