Appendix B.3

GIS Analysis of Available Land and Development Constraints in the Region

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Project Technical Memorandum

To: NYCDEP – OEPA
Subject: Crossroads DEIS Review -Deliverable B.4 – GIS Analysis of Available Land and Development Constraints in the Region
Date: January 21, 2004 (Finalized April 2004)

Introduction

This Technical Memorandum provides an in-depth review of the methodology and major findings related to determining how much land may potentially be available to support future development within the primary study area towns of Andes, Middletown, Shandaken, and Olive. Particular emphasis was placed on examining properties located along the NYS Route 28 corridor, as well as those that have access to a municipal sewer system, since these are considered to have a greater potential for being developed in the future for commercial or high-density residential uses. The analysis relied heavily on the use of a Geographic Information System (GIS) to examine a variety of regional land based and natural resource data sources that were considered appropriate for completing the required task.

Data Sources

All GIS data layers used in this analysis were obtained from the New York City Department of Environmental Protection's (NYCDEP) GIS Coordinator from the Bureau of Water Supply, Watershed Lands & Community Planning. Data sources for individual layers provided by that office include the following.

New York State Office of Real Property Services (ORPS) – Tax parcel maps and associated property data for tax year 2000-2001.

U.S. Geological Survey (USGS) – Slope maps were created by the NYCDEP based on digital elevation models obtained from the USGS.

Soil Conservation Service (SCS) – Digital soils mapping and soil characteristics cited in this analysis were compiled by the NYCDEP based on original soils maps prepared by the SCS.

New York State Department of Environmental Conservation (DEC) – Regulated wetland areas depicted in this analysis were delineated by this agency and revised as of November, 2001.

Federal Emergency Management Agency (FEMA) – Floodplain areas depicted in this analysis were created by NYCDEP based on information obtained from FEMA.

Methodology for Identifying Developable Land

Determining development potential within the four-town, primary study area was conducted through the use of a Geographic Information System (GIS). Through use of the GIS, RKG Associates was able to conduct overlay and proximity analyses with a variety of information that would not otherwise have been feasible, given the extent of the study area and the nature of the information being evaluated.

The methodology used for identifying areas within the study area which are potentially developable was essentially a two-step process. The first involved the use of the tax parcel GIS layer and its associated property information database. The tax parcel layer illustrates the approximate location and boundaries of all real property within the study area. The database, which is linked to the GIS layer by means of a common identifying data field, contains an array of information about each parcel, such as acreage, location, owner, value, use, etc. Therefore, the map and the database can be queried simultaneously to identify specific characteristics of all parcels in the study area which can then be displayed visually on the map. This was the approach used to identify which parcels within the study area are potentially developable. Once the developable land parcels were selected, they could then be "overlayed" with various development constraint features, such as steep slopes and wetlands, in order to estimate the net developable area that may be available for future development.

Selection of Potentially Developable Land Parcels

Land parcels that were identified as being potentially developable were divided into two categories; undeveloped and potentially subdividable. The initial step of separating the parcels into these two categories was determined by means of the Property Type Classification Code[1] (also referred to as the Use Code) which is contained within the GIS property information database. These use codes divide all properties into nine major categories based on their current use (such as residential, commercial, agricultural), and also identifies whether they are developed or undeveloped. Based on this classification system, appropriate use codes were selected from the database to establish which of the parcels in the study area are undeveloped.[2] Some agricultural codes were also included (crops only) since these properties are readily converted from their current use to other forms of residential or commercial development. Based on information provided by NYCDEP, all undeveloped parcels that are owned by either the NYCDEP or the New York State Department of Environmental Conservation (DEC) were excluded since they are considered to be restricted from future development. Similarly, properties that are subject to conservation easements, or are otherwise considered restricted from further development, based on NYCDEP records, were excluded from the developable lands analysis.

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[1] *Property Type Classification and Ownership Codes,* State Board of Real Property Services, State of New York, April 1998.

[2] Property use codes included in the undeveloped category: 105, 120-170, 310-323, 330-341, 380, 910-912.

The second category of potentially developable parcels are those that are presently developed but have the possibility of being further subdivided. The selection of developed parcels was limited only to those that have a single family house and are 10 acres or more in size.[3] The 10-acre threshold was selected because zoning standards for minimum lot size in the rural portions of the study area typically require five acres per dwelling. Therefore, single-family parcels with 10 or more acres could potentially be subdivided to allow for additional development, assuming that other development standards could be met (i.e. road frontage, setbacks, septic system installation, etc.). It should be noted that the 10-acre minimum was more restrictive when evaluating parcels located in village or hamlet areas where higher densities of development are typically permitted. Although the development potential on parcels that have an existing house is likely to be somewhat less than that of a parcel that has no development, these properties should still be considered as a viable land base that could support some level of future development within the region. In addition, it should be noted that there may also be the potential for further development of land parcels in the study area that have existing commercial or industrial uses. However, it was not considered feasible to make an assessment of this potential for all properties within the regional study area due to data limitations and the possibility of greater site development options for non-residential developments.

Evaluating Potential Development Constraints

Potential development constraints considered within this analysis included an array of natural resource features that exist throughout the regional study area. More specifically, these include steep slopes, shallow soils, streams and other surface waters, wetlands, and floodplains. While it can be generally stated that each of these resources represents potential constraints for land development, the type of limitation and the level of restriction varies considerably, a concept which is discussed below. Figure 1 presents a graphic illustration of the extent to which these resource constraints are found within the four-town study area.

An overall caveat regarding the constraints mapping should be presented at this point. The natural resources data that was used in the GIS analysis was developed from a variety of source data that is acquired and digitized by a number of State and Federal agencies. How the original data was gathered affects its accuracy and the scale at which it is best displayed. Generally speaking, the most appropriate use of the natural constraints data available for the study area is presentation at the town or regional scale, as opposed to at the parcel level. This is because the data is acquired from sources such as aerial photography, satellite images, or regional field mapping that limits their suitability for site-specific evaluations. For example, the county-wide soil survey, which is the basis for the GIS soils data layer, is well suited for town planning but is not considered accurate enough for siting a septic system. Such a procedure would require a

[3] Property use codes included in the potentially subdividable category: 210, 240, 250, 260, 270.

higher intensity survey of the soils on a given parcel. Likewise, the slope mapping is based on an average of the percentage of the slope across a broader geographic area which could vary considerably on a specific parcel of land. Therefore, while the data layers employed within the GIS analysis are considered to be the best available information to complete the task, they should be viewed as presenting average conditions within the study area which would need further on-site investigations to confirm or revise.

Topography – One of the most limiting natural features found within the study area are the steep slopes. These slopes represent potential limitations for installing on-site septic systems as well as concerns related to erosion, sedimentation and other types of environmental degradation. City and State regulations[4] related to the installation of septic systems generally limit the maximum slope to 15%, although up to 20% is permitted under certain circumstances. Septic system installation, as well as most other types of development, are not permitted on slopes in excess of 20%. Based on these factors, a maximum slope of 20% was used as the threshold for determining the net developable area of parcels within the study area that were identified as being potentially developable. It is acknowledged that there will be variation in the amount of development permitted on a site as the slope increases. For example, areas with slopes less than 10% are likely to accommodate a higher density of development than slopes ranging between 10% and 20%. However, given the limitations of the constraints mapping, which were discussed above, it was determined that attempting to differentiate the amount of development that could occur at the sub-parcel level would have well exceeded the accuracy for which this mapping was created.

[4] *Appendix 75-A Wastewater Treatment Standards – Individual Household Systems,* Part 75, New York State Codes, Rules and Regulations (NYCRR), Title 10, Chapter II, and
Design Standards for Wastewater Treatment Works, Intermediate Sized Sewerage Facilities, New York State Department of Environmental Conservation, 1988.

Soils – Along with steep slopes, soils characteristics in the study area represent the second most limiting factor for development due to the requirements for installation of on-site septic systems. Generally speaking, City and State regulations related to installation of a conventional absorption field to treat wastewater from residential or commercial uses require that four feet of useable soil exist above the bedrock or seasonal high watertable.[4] As illustrated in Figure 1, based on the available soils mapping data, this limitation would preclude most of the land within the study area from being developed if access to a municipal wastewater system was not available. However, exceptions within the regulations could potentially allow shallow soils to be used under certain conditions (e.g. through the use of a limited amount of fill). In addition, alternative designs to the conventional absorption field septic system designs may also be acceptable under certain conditions.

Given the fact that on-site soil investigation is necessary to determine suitability for septic system installation, as well as the fact that alternative systems can be used, eliminating all soils within the study area with a depth of less than four feet from being potentially developable for the purpose of this analysis was considered excessive. However, it is clear, based on the large portion of the study area in Figure 1 categorized as having shallow soil depth, that the amount of land identified later in this memo as being potentially developable will be further constrained by the soil's ability to accommodate on-site treatment of wastewater.

Surface Waters – From a regulatory and water quality standpoint, the substantial number of streams, as well as other water bodies, that course through the study area present an additional limiting factor for land development. While runoff into these surface waters is a concern, the potential development limitation is related more to crossing the streams, and their associated buffer area, in order to obtain access to various portions of a particular land parcel. Regulatory buffers require a 100-foot setback from streams, rivers, and lakes, and 300 feet from reservoirs. In addition, septic systems cannot be sited within these buffer areas. These regulatory buffers do not apply in designated village and hamlet areas, as long as a stormwater management plan is developed.

As illustrated in Figure 1, these buffer areas exist throughout the study area. However, it was not considered appropriate to remove the acreage contained within these buffers from the estimated supply of developable land since it is not a factor in determining the potential density of development on a given parcel. Nevertheless, the existence of these buffers will likely result in a limitation on the total amount of development that might otherwise occur on parcels within the study area.

Wetlands – Wetland areas present another potential development limitation within the study area. However, only specific wetlands areas are regulated by the DEC. These locations have been mapped and are illustrated in Figure 1. While

development within these wetlands, as well as their associated buffer areas, is restricted, the total acreage contained within these sites was not considered to be a factor in determining the net developable land acreage within the study area. The same is considered to be true for the National Wetlands Inventory (NWI) wetlands in the study area which are regulated by the U.S. Army Corps of Engineers (ACOE).

Floodplains – A portion of the study area lies within the 100-year floodplain as identified by the Federal Emergency Management Agency (FEMA). As illustrated in Figure 1, this area is confined primarily to the areas adjacent to portions of the East Branch of the Delaware River, Esopus Creek, and other tributaries. Development within the floodplain is typically not precluded by any of the area's regulatory bodies, including the local land use regulations of study area towns. Therefore, the land area contained within the floodplain was not eliminated from the net developable acreage within the study area. However, it is possible that the potential amount of development that can occur on parcels located within the floodplain will be reduced if the cost of engineering the necessary site design alternatives exceeds the value of the proposed development.

Zoning – Along with the natural constraints discussed above, local zoning regulations will also have an effect on influencing the amount and type of development that may occur on the potentially developable land within the study area. Each of the four towns, including the village and hamlet areas, are divided into a number of zoning districts which specify permitted uses, allowable density, and other standards that must be met in order to receive development approval from the local jurisdiction. While these regulations vary amongst the study area municipalities, there are a number of similarities within the respective ordinances. From an overall perspective, the towns have established zoning districts that are intended to encourage a higher density, mixed use pattern of land development within the villages and designated hamlet areas. The minimum lot size within these districts generally ranges from 15,000 square feet up to one acre, depending on the availability of municipal water and sewer. Outside of the village/hamlet areas, minimum lot sizes typically range between 1.5 acres and 5 acres.

Within all of these zoning districts, a specific designation is assigned to each type of land use (i.e. single family home, apartments, gas station, hotel, etc.) as to whether it is permitted by right or prohibited. There is also a third designation, referred to as a special permit, which allows for other types of land uses if approval is granted by the Planning Board, based on an additional set of site development criteria. It would not be practical to list in this memo all of the various land uses permitted within each of the zoning districts for all four towns. However, from a general perspective the regulations typically permit a broader variety of residential and commercial uses to be constructed within the village and hamlet areas by right and at higher densities. The types of uses permitted to be established by the zoning regulations outside these designated areas also include a

variety of commercial and residential uses, however, receiving approval for such uses is more likely to require obtaining a special permit to ensure that potential impacts to the affected area are considered. The standards and requirements for obtaining a special permit approval vary somewhat for each town. Generally speaking, these regulations require that a proposed use be compatible with surrounding development, not create safety or health hazards, and not conflict with the town's comprehensive plan. Depending on the type of use proposed (e.g. multi-family housing, gasoline station, hotel/motel), the regulations also provide more specific criteria for site design issues such as parking lot construction, surface runoff, maximum lot coverage, water supply and sewage disposal, etc.

Assessment of Developable Land in the Primary Study Area

Using the methodology described above, the amount of potentially developable land in the primary study area (the towns of Andes, Middletown, Shandaken, and Olive) has been estimated. The data is presented at three geographic levels which include: the four town study area; parcels along the NYS Route 28 corridor; and parcels in the village/hamlet areas, especially those districts that have access to a municipal sewer system. These latter areas include Margaretville, Pine Hill, and Fleischmanns. The NYS Route 28 corridor and the village/hamlet areas are considered to be the most likely places for commercial development to occur within the study area. Residential development can occur at all locations within the study area, however, the permitted density of dwelling units, as prescribed by local zoning, is generally higher in the village/hamlet areas, especially if municipal sewer or water is available.

Developable Land in the Primary Study Area

Figure 2-1 illustrates the parcels within the primary study area that are considered to be potentially developable. These include parcels that have been identified as currently undeveloped in the property assessment database. It also includes parcels with a single family house that are 10 acres or larger in size, which are considered to have the potential for further development if subdivided.

The total acreage of undeveloped land in the primary study area is approximately 51,900. The total acreage of land that is considered to be potentially subdividable is approximately 51,200. If a portion of this latter acreage is deducted to allow for the existing house on the property (5 acres per dwelling), the amount of potentially subdividable land in the study area is reduced to approximately 45,700 acres. This represents a combined developable acreage of approximately 97,000 acres within the study area, as summarized in Tables 1 and 2. As illustrated in Figure 2-1, the Town of Shandaken contains the least amount of potentially developable land in both categories. This is primarily attributable to the fact that a majority of the land area is publicly owned and thus, considered undevelopable.

Table 1
Undeveloped Acreage in Primary Study Area Towns
Andes - Middletown - Shandaken - Olive

	# Parcels	Total Acres	Acreage with Slopes Less Than 20%	Avg. Lot Size
SHANDAKEN				
Pine Hill	30	72		2.4
Big Indian	4	4		1.7
Phoenicia	47	180		3.8
Chichester	5	7		2.5
Mt. Tremper	3	23		7.5
Allaben	11	157		14.2
Town Remainder	758	8,695		11.5
Town Total	**858**	**9,138**	**2,893**	**10.6**
MIDDLETOWN				
Margaretville	58	73		1.3
Fleischmanns	79	208		2.6
Arkville	30	109		3.6
Town Remainder	1,114	15,060		13.5
Town Total	**1,281**	**15,450**	**7,709**	**12.1**
OLIVE				
Boiceville	18	52		2.9
Ashokan	15	40		2.7
Town Remainder	672	9,527		14.1
Town Total	**705**	**9,619**	**5,282**	**13.6**
ANDES				
Andes Village	36	322		8.9
Town Remainder	787	17,358		22
Town Total	**823**	**17,680**	**7,870**	**21.5**
Study Area Total	**3,667**	**51,887**	**23,754**	

Source: Property assessment database records and RKG Associates, Inc.

Table 2
Potentially Subdividable Acreage in Primary Study Area Towns
Andes - Middletown - Shandaken - Olive

	# Parcels	Total Acres	Acreage with Slopes Less Than 20%	Avg. Lot Size
SHANDAKEN				
Pine Hill	1	11		11
Big Indian	2	65		32.5
Phoenicia	2	33		16.7
Chichester	-	-		
Mt. Tremper	-	-		
Allaben	-	-		
Town Remainder	132	4,787		
Town Total	**137**	**4,897**	**1,780**	**35.7**
MIDDLETOWN				
Margaretville	3	51		17.1
Fleischmanns	2	73		36.7
Arkville	-	-		
Town Remainder	337	17,358		51.5
Town Total	**342**	**17,843**	**8,346**	**51.1**
OLIVE				
Boiceville	1	12		12
Ashokan	1	15		15
Town Remainder	218	6,236		28.6
Town Total	**220**	**6,263**	**3,837**	**28.4**
ANDES				
Andes Village	8	208		26
Town Remainder	382	22,001		57.6
Town Total	**390**	**22,209**	**10,006**	**56.9**
Study Area Total	**1,089**	**51,212**	**23,969**	
Potentially Available for Development [1]		**45,767**	**18,524**	

[1] Represents the total acres less 5 acres for each of the 1,089 existing houses
Source: Property assessment database records and RKG Associates, Inc.

These gross estimates of potentially developable land within the study area were reduced, by means of a GIS overlay analysis, to reflect areas constrained by slopes in excess of a 20% grade. This assessment is illustrated in Figure 2-2. In addition, the acreage of

potentially developable land was reduced to reflect the estimated portion of that land area that is affected by this constraint. As shown in Tables 1 and 2, applying the slope constraints reduces the total potentially developable acreage of 97,000 to a net acreage of approximately 42,300, or 43% of the gross figure. The largest decrease occurred in the Town of Shandaken, which was reduced by almost two-thirds, due to the significant concentration of slopes in this community.

An examination of Figure 2-2 reveals that removal of the steeper slopes results in a fragmented appearance of the potentially developable land area. This factor, combined with the need to find suitable locations for on-site septic systems on the remaining unconstrained areas, would certainly limit the amount and density of development that could occur within the study area. However, the net developable acreage of 42,300 acres is still considered to be adequate to support a considerable amount of future growth.

Developable Land Along the NYS Route 28 Corridor

A subset of properties extracted from the primary study area's developable land inventory was examined along the NYS Route 28 corridor within each of the four towns. Parcels along this corridor are considered to have the greatest potential for commercial development given the higher traffic volumes and better access. In addition, zoning along this corridor, particularly in the village and hamlet districts, is more conducive for siting various types of non-residential uses.

Parcels within 1,000 feet of the corridor were selected by means of the GIS. The 1,000 foot threshold was considered a reasonable distance that would be acceptable for a variety of non-residential uses that may or may not require a high degree of visibility from the roadway, but could still be easily reached by means of a relatively short access road. This 2,000-foot buffer around the NYS Route 28 corridor is also more likely to be less restrictive in terms of steep slopes given that it parallels the river valley bottom.

Figures 3-1 through 6-2 illustrate the potentially developable parcels located within 1,000 feet of NYS Route 28 in the towns of Andes, Middletown, Shandaken and Olive. Once again the parcels have been categorized as either currently undeveloped or potentially subdividable (i.e. they contain a single family house and are at least 10 acres in size). As shown in Table 3, the total undeveloped acreage along the corridor is approximately 6,400 acres, with approximately 4,000 additional acres that is potentially subdividable, representing a gross developable acreage of approximately 10,400 acres. When slopes in excess of 20% are deducted from this gross figure it is reduced to approximately 5,200 net developable acres. Figures 3-1 through 6-2 illustrate the effect of removing steep slopes from the potentially developable parcels along the NYS Route 28 corridor.

Table 3
Potentially Developable Land on the NYS Route 28 Corridor
Primary Study Area Towns

	Undeveloped Parcels			Potentially Subdividable Parcels		
	# Parcels	Total Acres	Acreage with Slopes Less Than 20%	# Parcels	Total Acres	Acreage with Slopes Less Than 20%
Andes	90	1,566	910	30	1,360	473
Middletown	211	2,422	1,172	23	1,922	850
Shandaken	293	2,007	955	34	1,076	459
Olive	95	379	298	11	174	119
Total	**689**	**6,374**	**3,335**	**98**	**4,532**	**1,901**
Potentially Available for Development [1]					**4,042**	**1,411**

[1] Represents the total acres less 5 acres for each of the 98 existing houses
Source: Property assessment database records and RKG Associates, Inc.

Development Potential in Margaretville, Arkville, Fleischmanns and Pine Hill

A more detailed analysis was conducted in the village of Margaretville and the designated hamlets of Arkville, Fleischmanns, and Pine Hill because properties in these districts have the potential to tie into municipal sewer systems. This factor is considered to greatly increase the potential for development of these parcels. It is our understanding that the Margaretville/Arkville sewer districts as well as the Pine Hill district currently have excess treatment capacity. The Fleischmanns district however, is at or near capacity but may be expanded in the future.

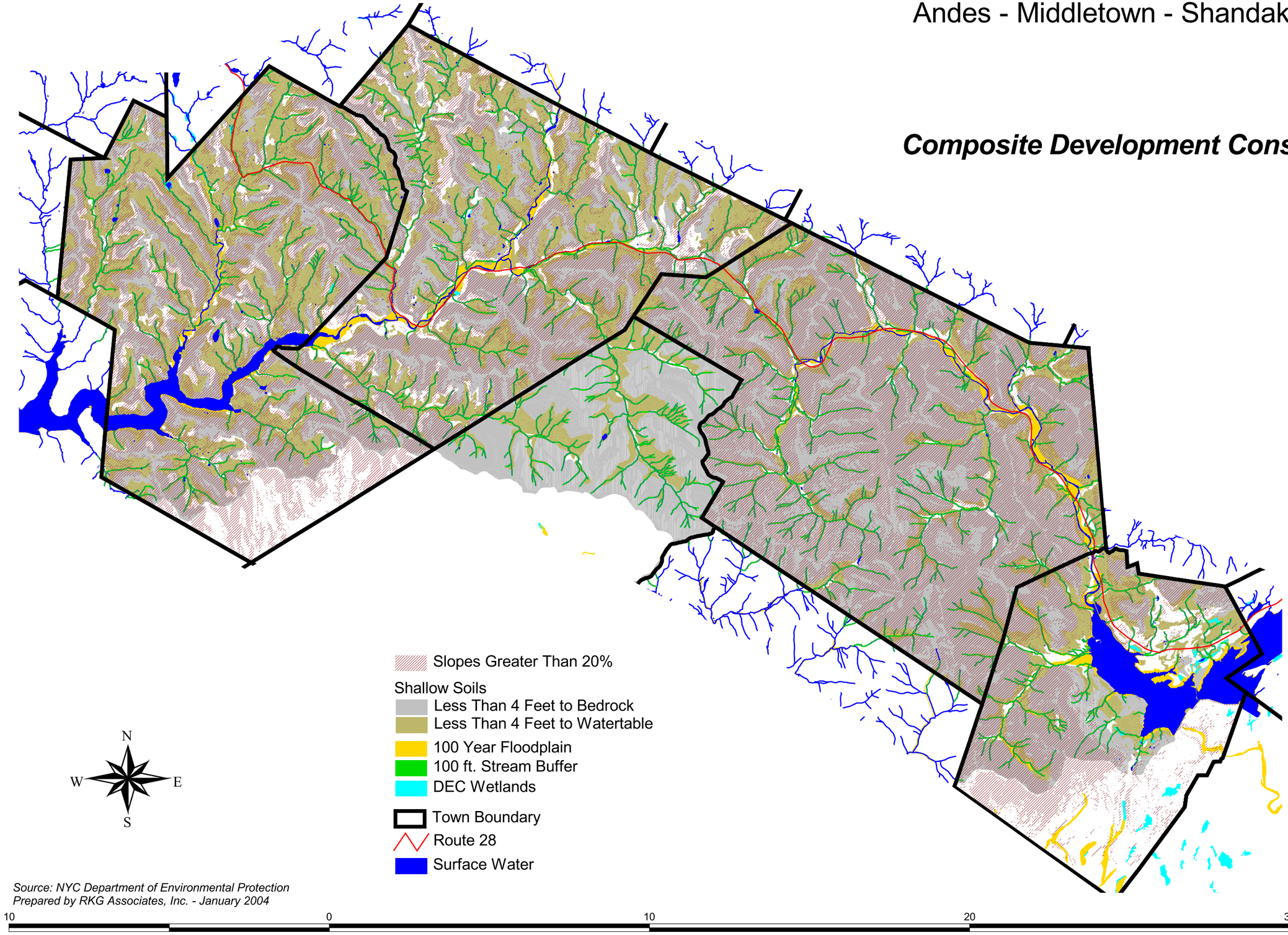
Table 4
Undeveloped Acreage in Village/Hamlet Areas with Access to Municipal Sewer Systems

	# Parcels	Acres	Average Parcel Size
Arkville	33	153	4.6
Margaretville	52	71	1.4
Fleischmanns	79	208	2.6
Pine Hill	30	72	2.4

Source: Property assessment records and RKG Associates, Inc.

Table 4 shows the number of parcels, total acreage, and assessed value of the undeveloped parcels within these four district areas. In addition, Figures 7 through 9 highlight the map/lot numbers for some of the larger undeveloped parcels located within the four districts.

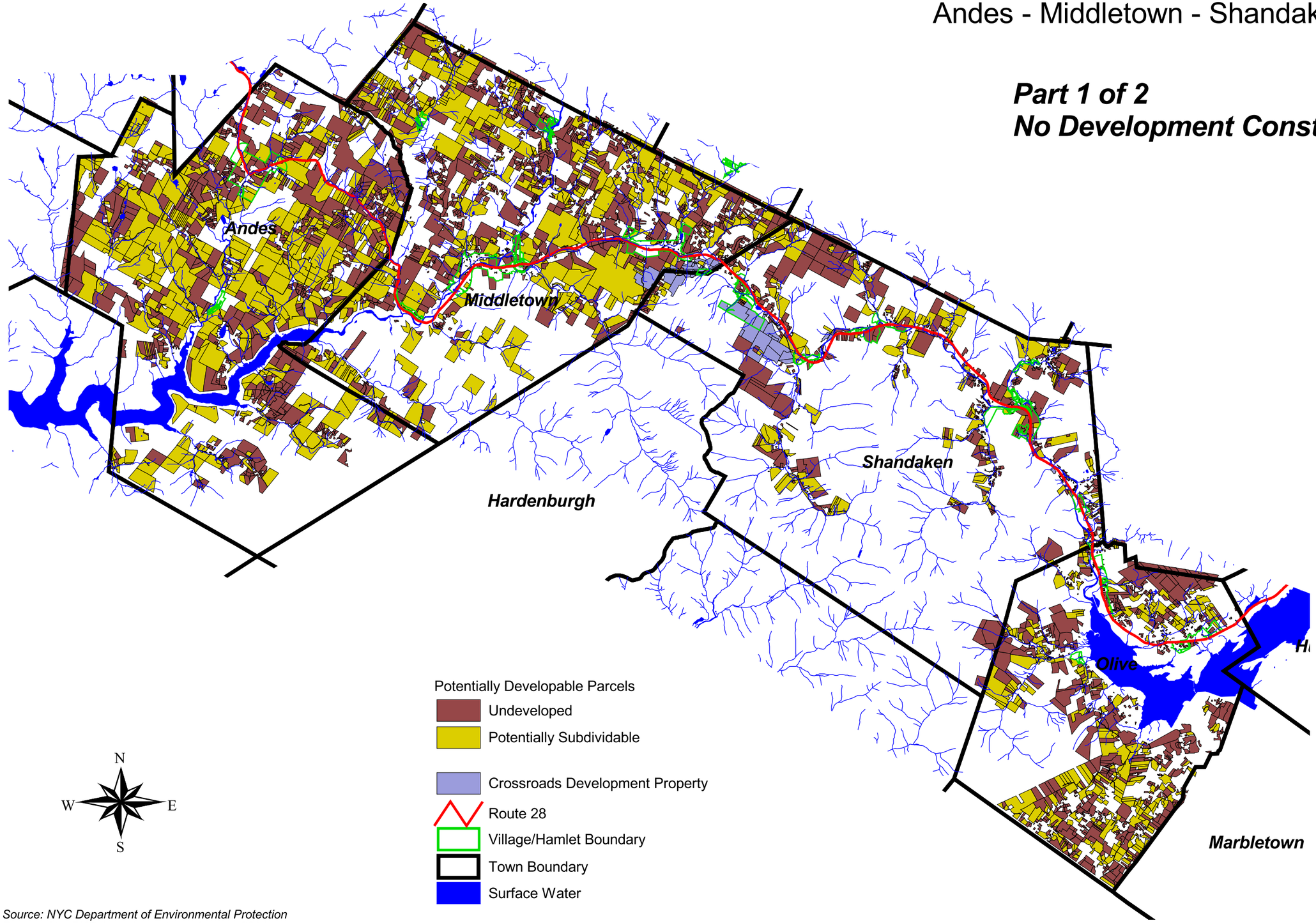
Two of the parcels in Figure 7 (1-1-54.1 and 1-1-52) are located between the Margaretville and Arkville district boundaries which may limit their potential access to the municipal sewer system. However, their location between these two districts would seem to make them well suited for annexation at some point in the future. In addition, some of the parcels included in this inventory are municipally owned which may preclude them from future development. However, they have been included until such time as their exact status can be determined.



Source: NYC Department of Environmental Protection
Prepared by RKG Associates, Inc. - January 2004

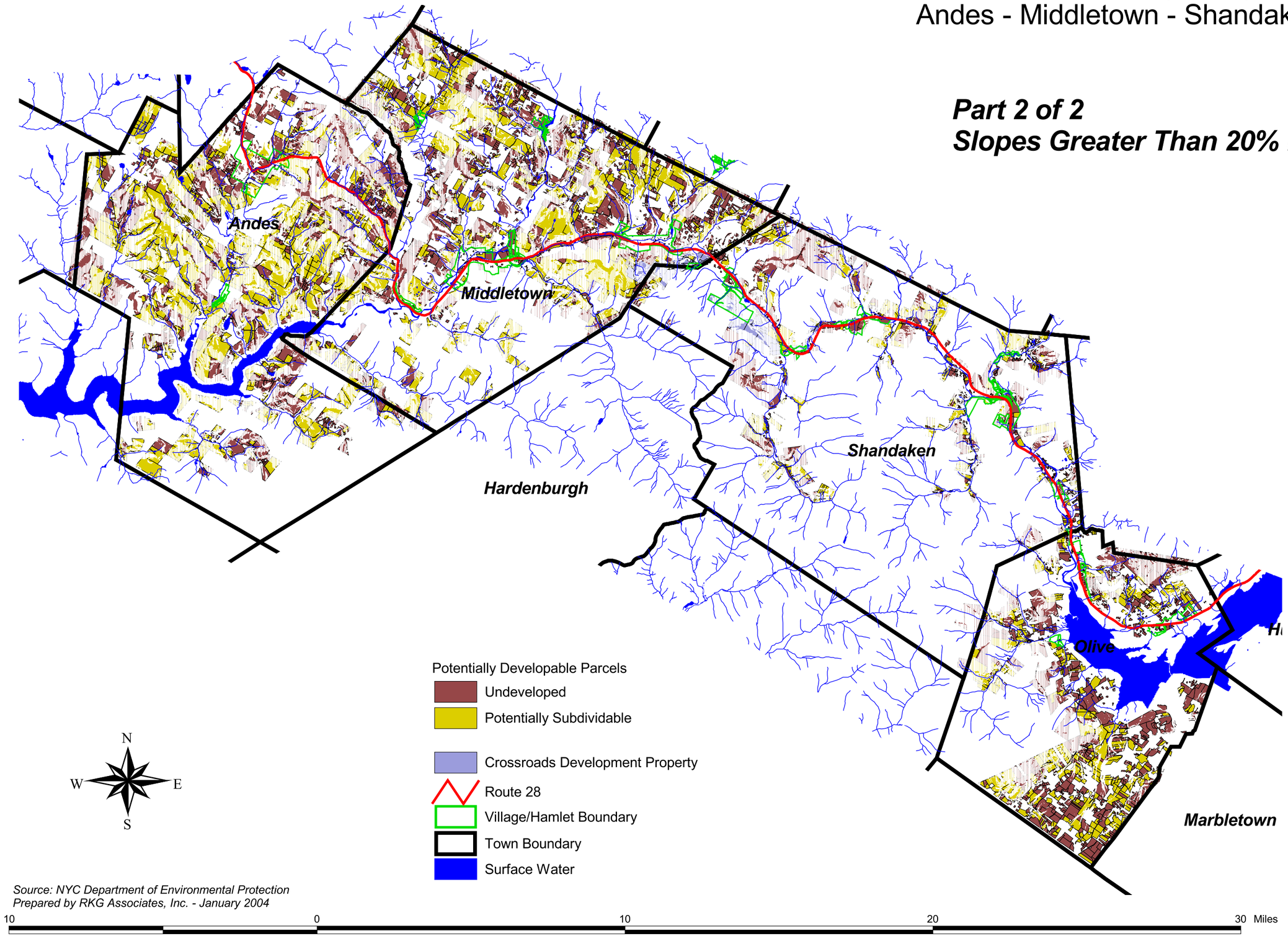
Figure 1

Part 1 of 2
No Development Constraints



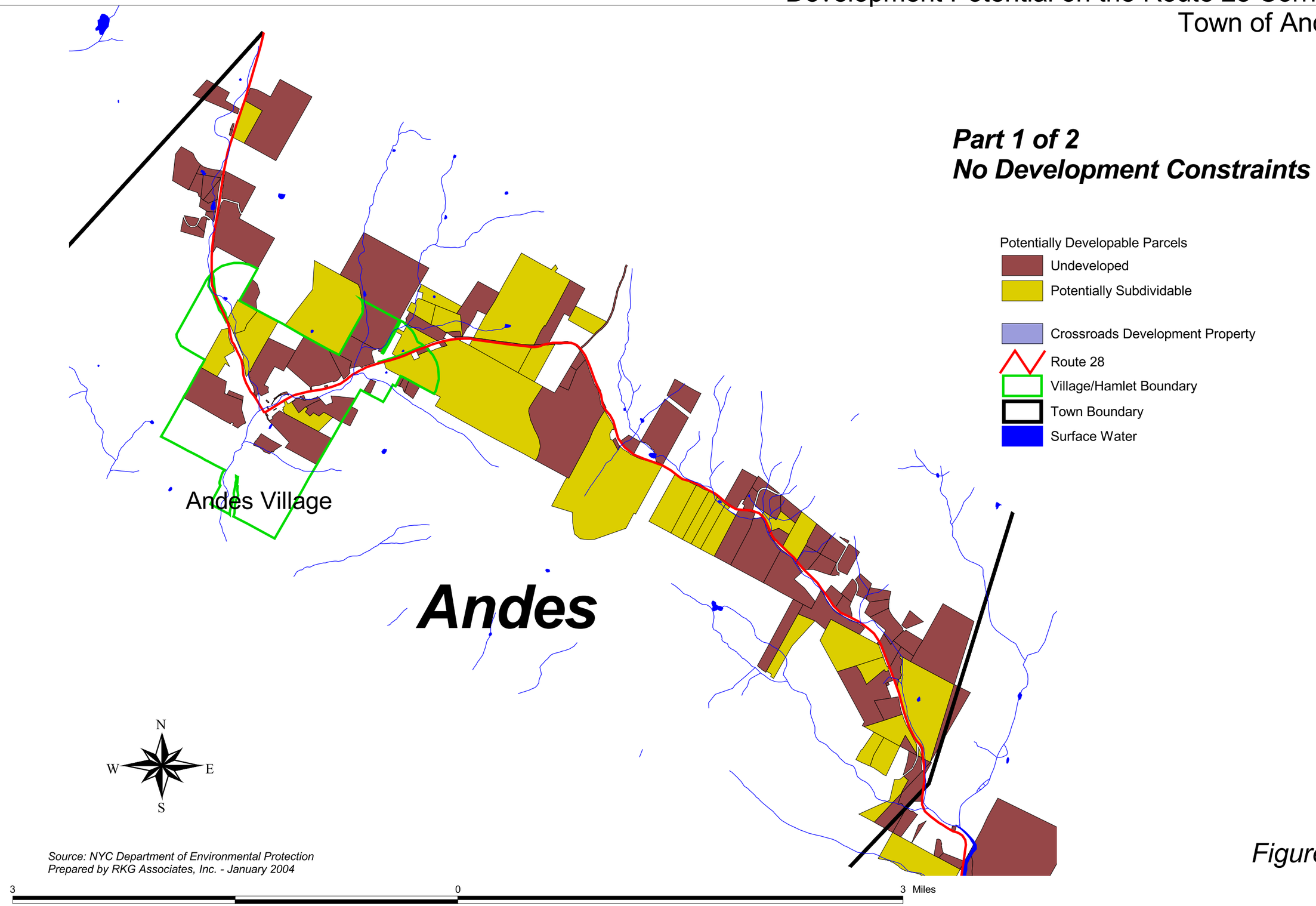
Source: NYC Department of Environmental Protection
Prepared by RKG Associates, Inc. - January 2004

Figure 2-1



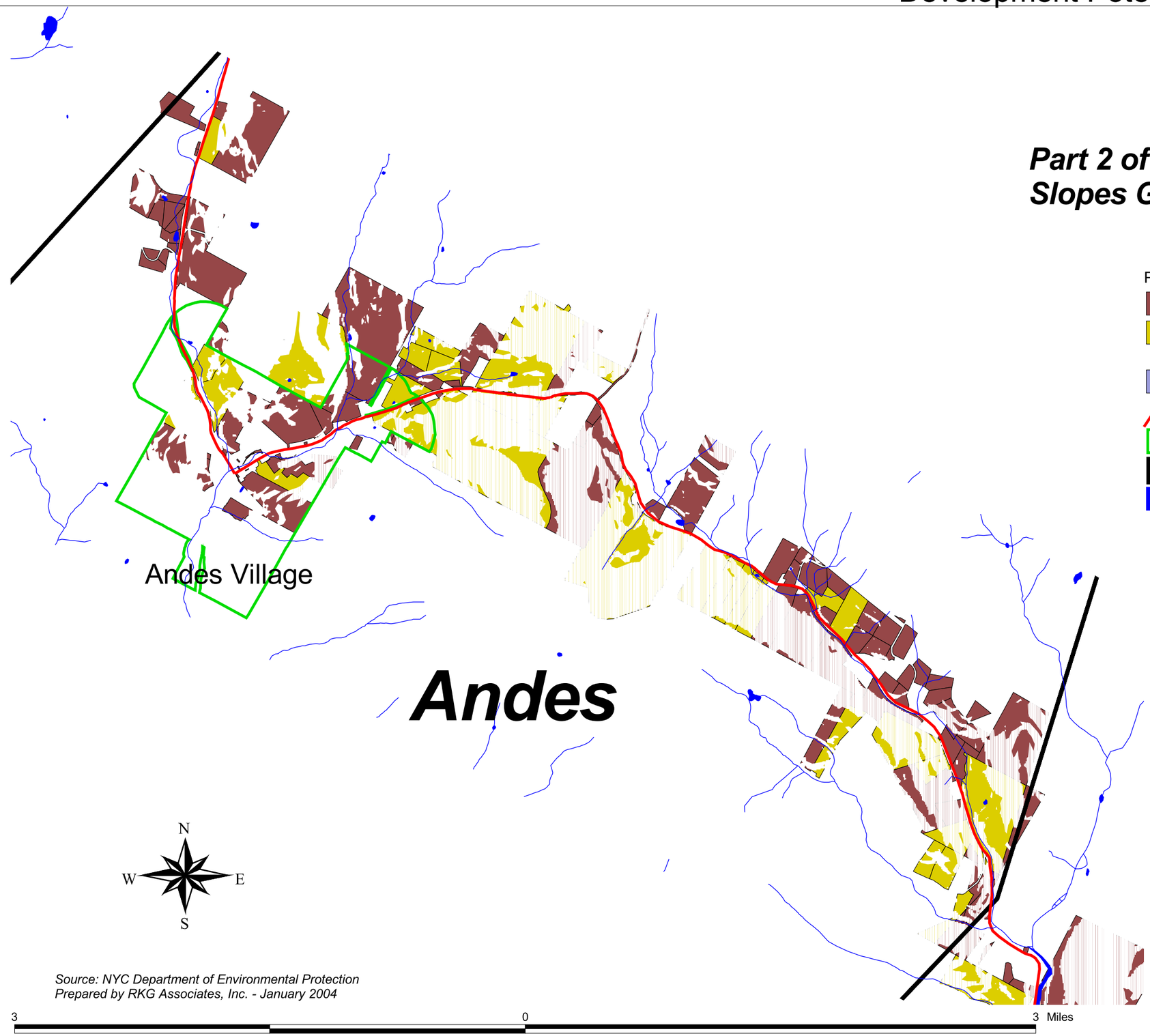
Source: NYC Department of Environmental Protection
Prepared by RKG Associates, Inc. - January 2004

Figure 2-2



Source: NYC Department of Environmental Protection
Prepared by RKG Associates, Inc. - January 2004

Figure 3-1



Part 2 of 2
Slopes Greater Than 20% Removed

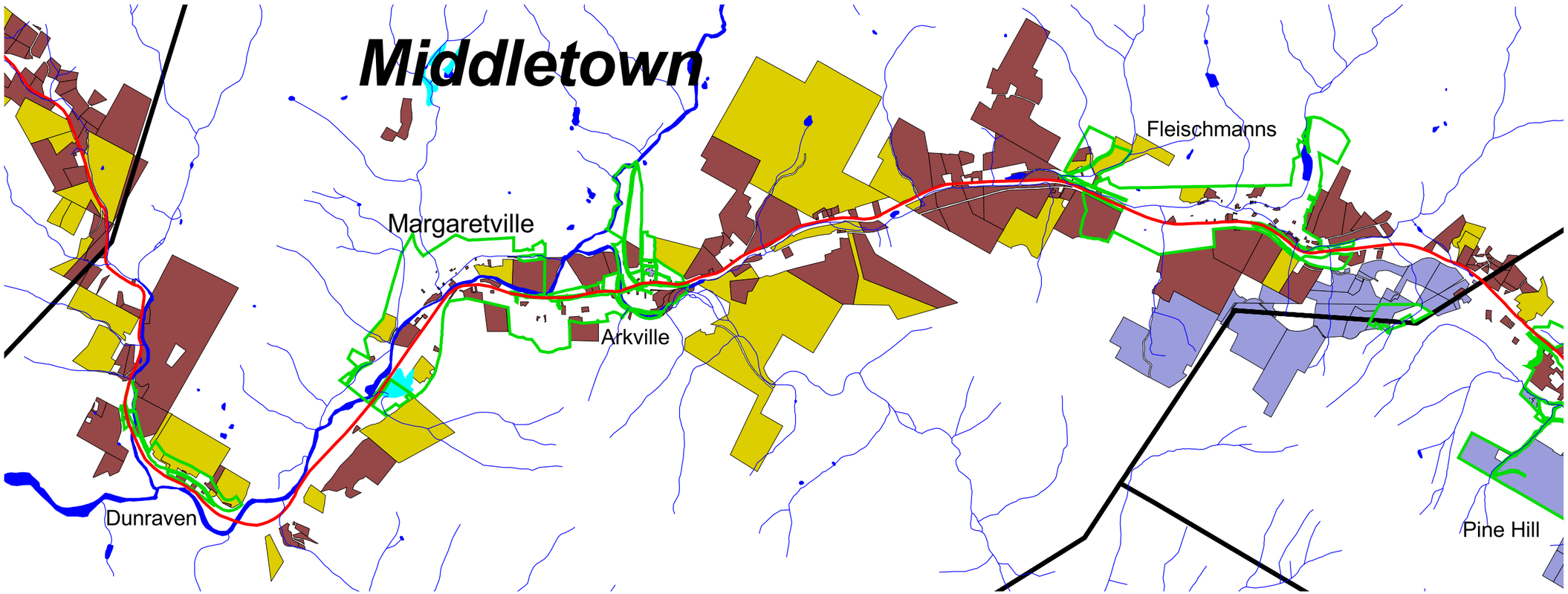
Potentially Developable Parcels
- Undeveloped
- Potentially Subdividable

- Crossroads Development Property
- Route 28
- Village/Hamlet Boundary
- Town Boundary
- Surface Water

Source: NYC Department of Environmental Protection
Prepared by RKG Associates, Inc. - January 2004

Figure 3-2

Part 1 of 2
No Development Constraints



Potentially Developable Parcels
- Undeveloped
- Potentially Subdividable

- Crossroads Development Property
- Route 28
- Village/Hamlet Boundary
- Town Boundary
- Surface Water

N
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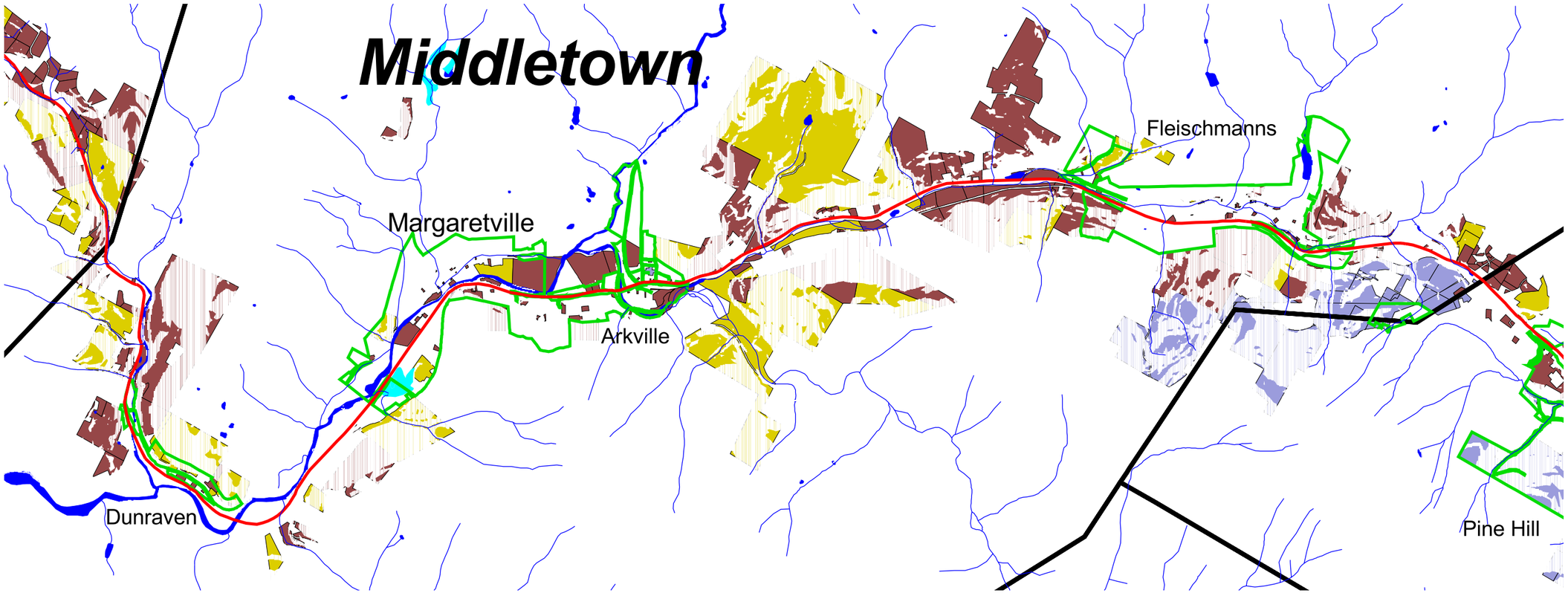
Source: NYC Department of Environmental Protection
Prepared by RKG Associates, Inc. - January 2004

4 0 4 8 Miles

Figure 4-1

Part 2 of 2
Slopes Greater Than 20% Removed



Potentially Developable Parcels
- Undeveloped
- Potentially Subdividable

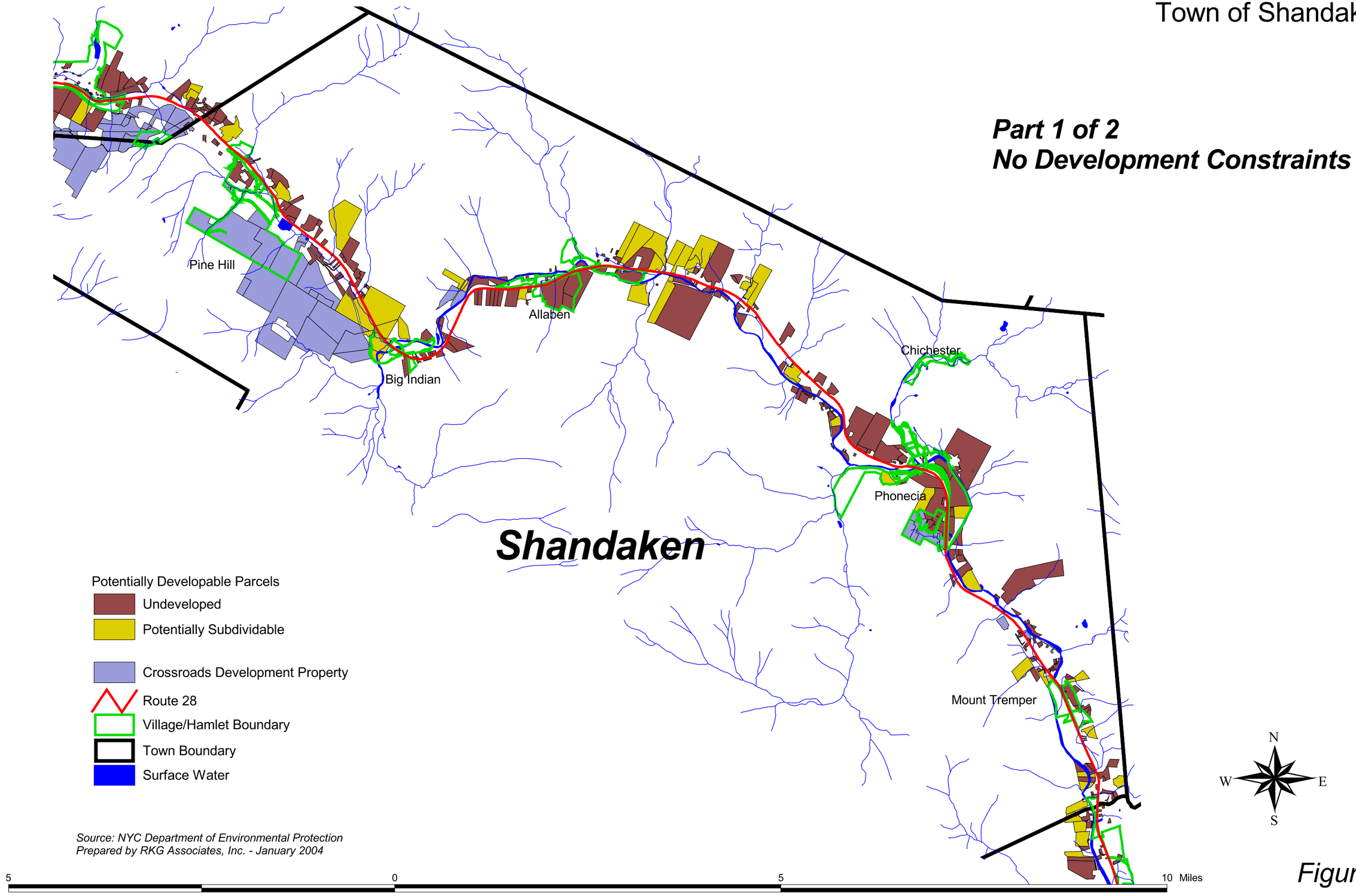
- Crossroads Development Property
- Route 28
- Village/Hamlet Boundary
- Town Boundary
- Surface Water

N
W E
S

Source: NYC Department of Environmental Protection
Prepared by RKG Associates, Inc. - January 2004

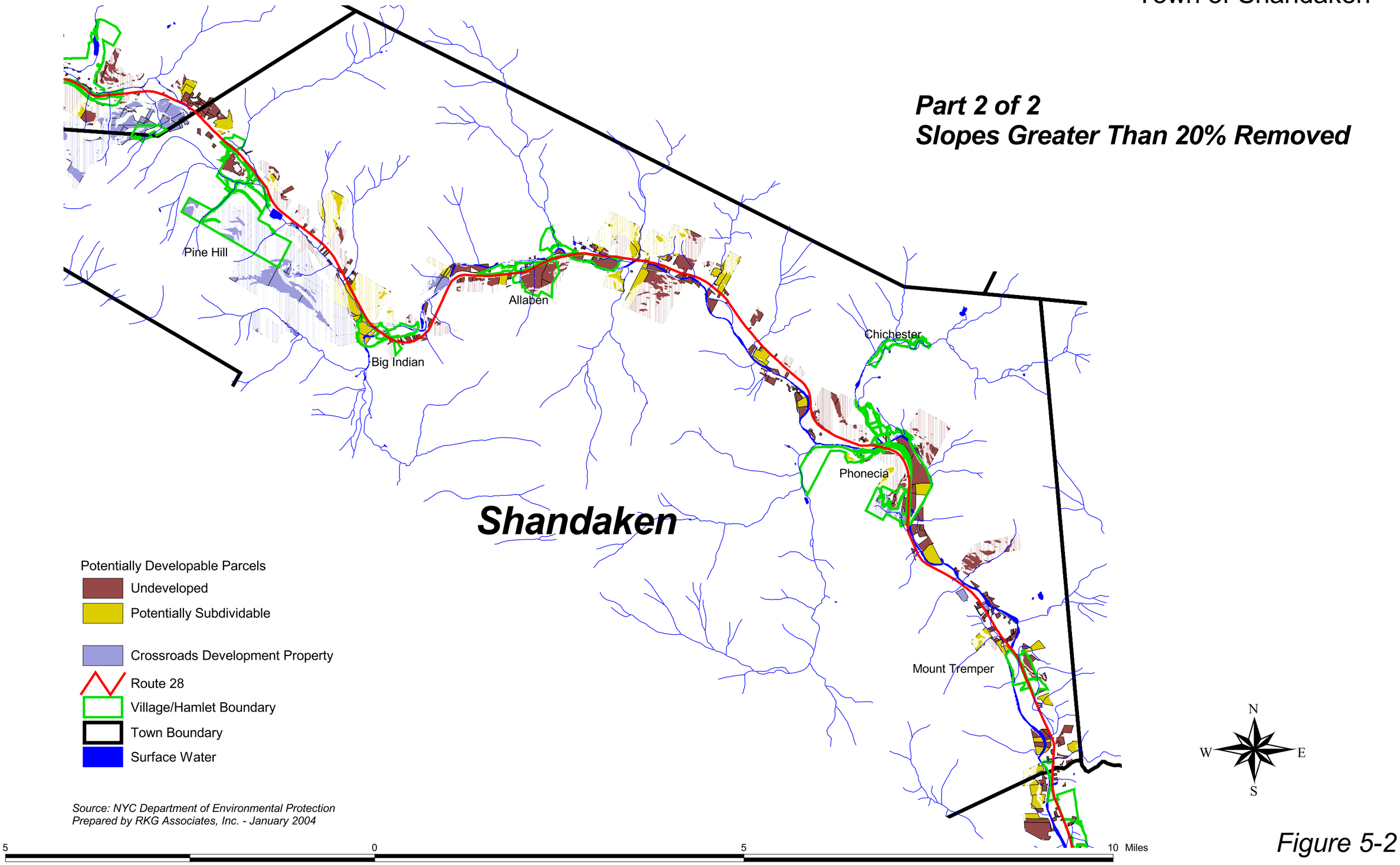
4 0 4 8 Miles

Figure 4-2



Source: NYC Department of Environmental Protection
Prepared by RKG Associates, Inc. - January 2004

Figure 5-1


Part 2 of 2
Slopes Greater Than 20% Removed
Pine Hill
Allaben
Big Indian
Chichester
Phonecia
Shandaken
Mount Tremper
Potentially Developable Parcels
Undeveloped
Potentially Subdividable
Crossroads Development Property
Route 28
Village/Hamlet Boundary
Town Boundary
Surface Water
Source: NYC Department of Environmental Protection
Prepared by RKG Associates, Inc. - January 2004
5
0
5
10 Miles
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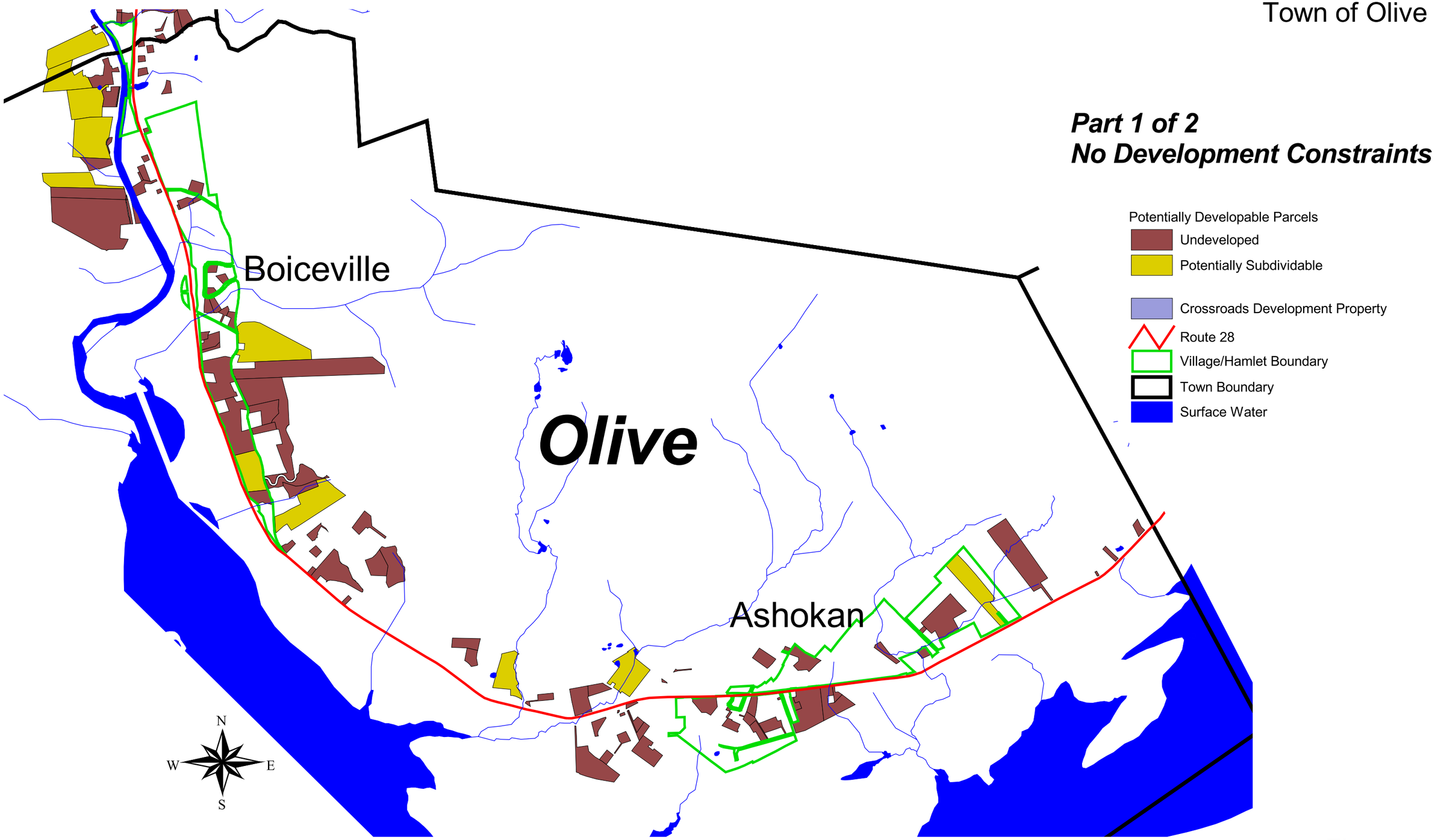
S

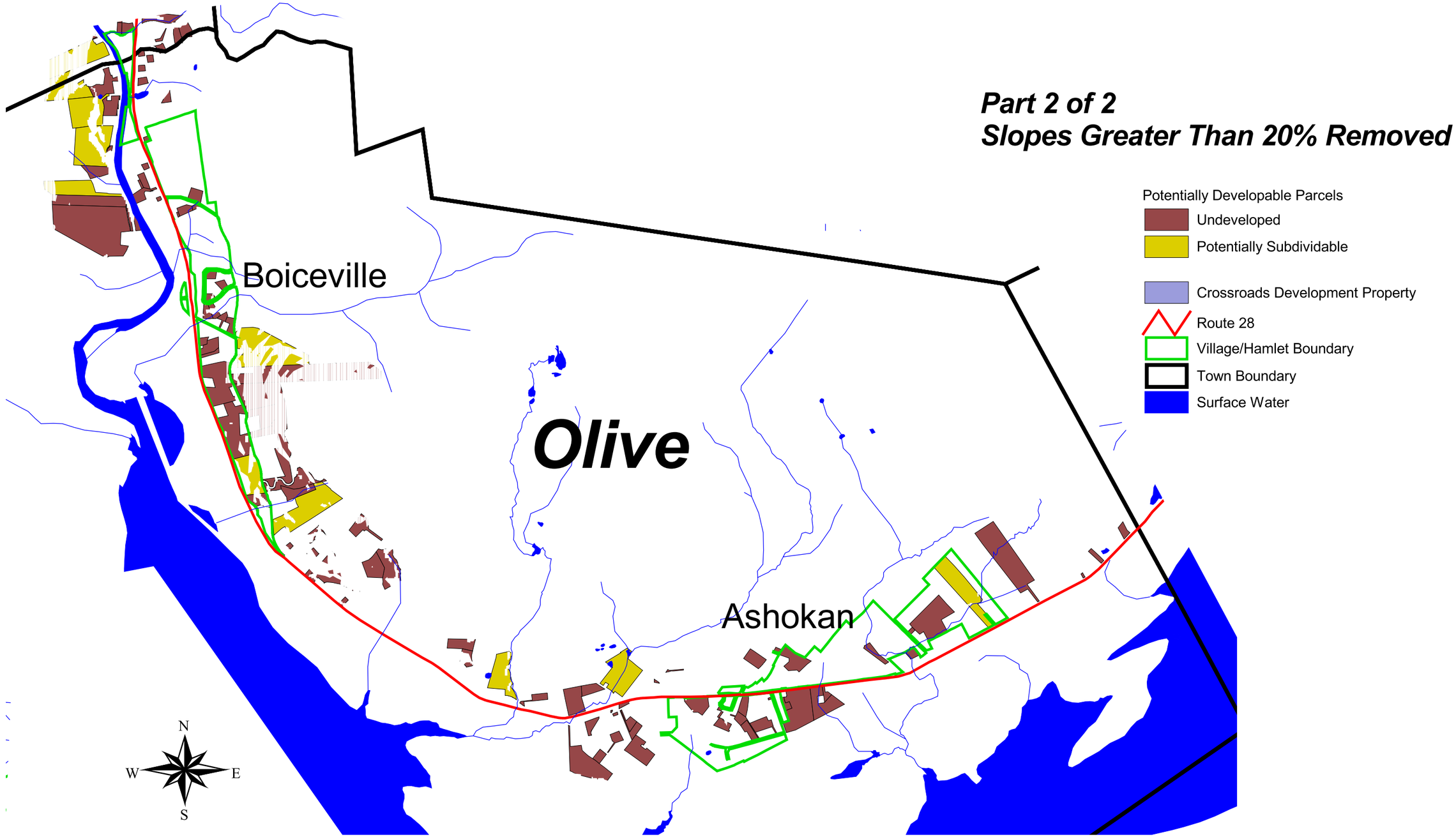
Figure 5-2



Source: NYC Department of Environmental Protection
Prepared by RKG Associates, Inc. - January 2004

Figure 6-1

2 0 2 4 Miles

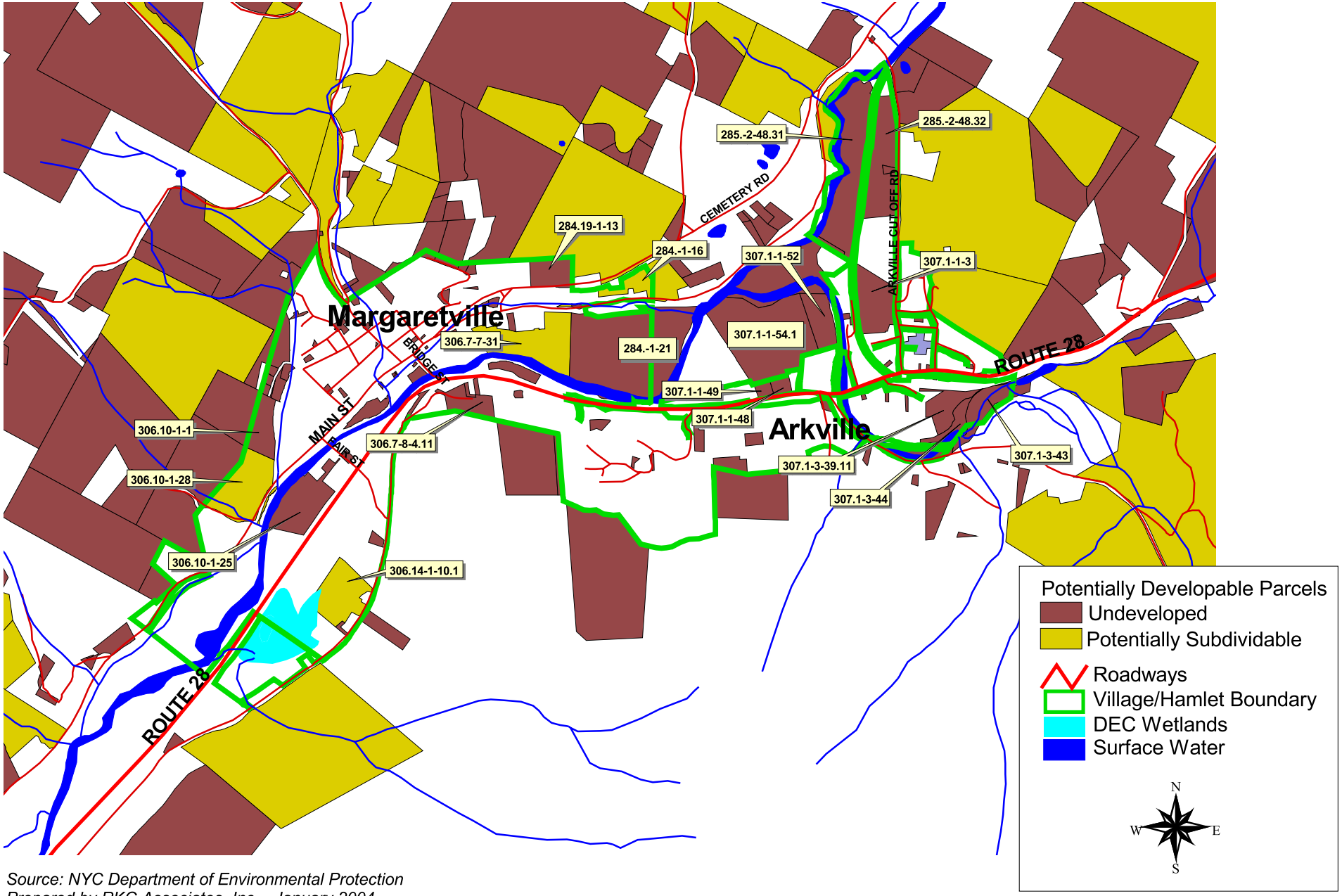


Source: NYC Department of Environmental Protection
Prepared by RKG Associates, Inc. - January 2004

2 0 2 4 Miles

Figure 6-2

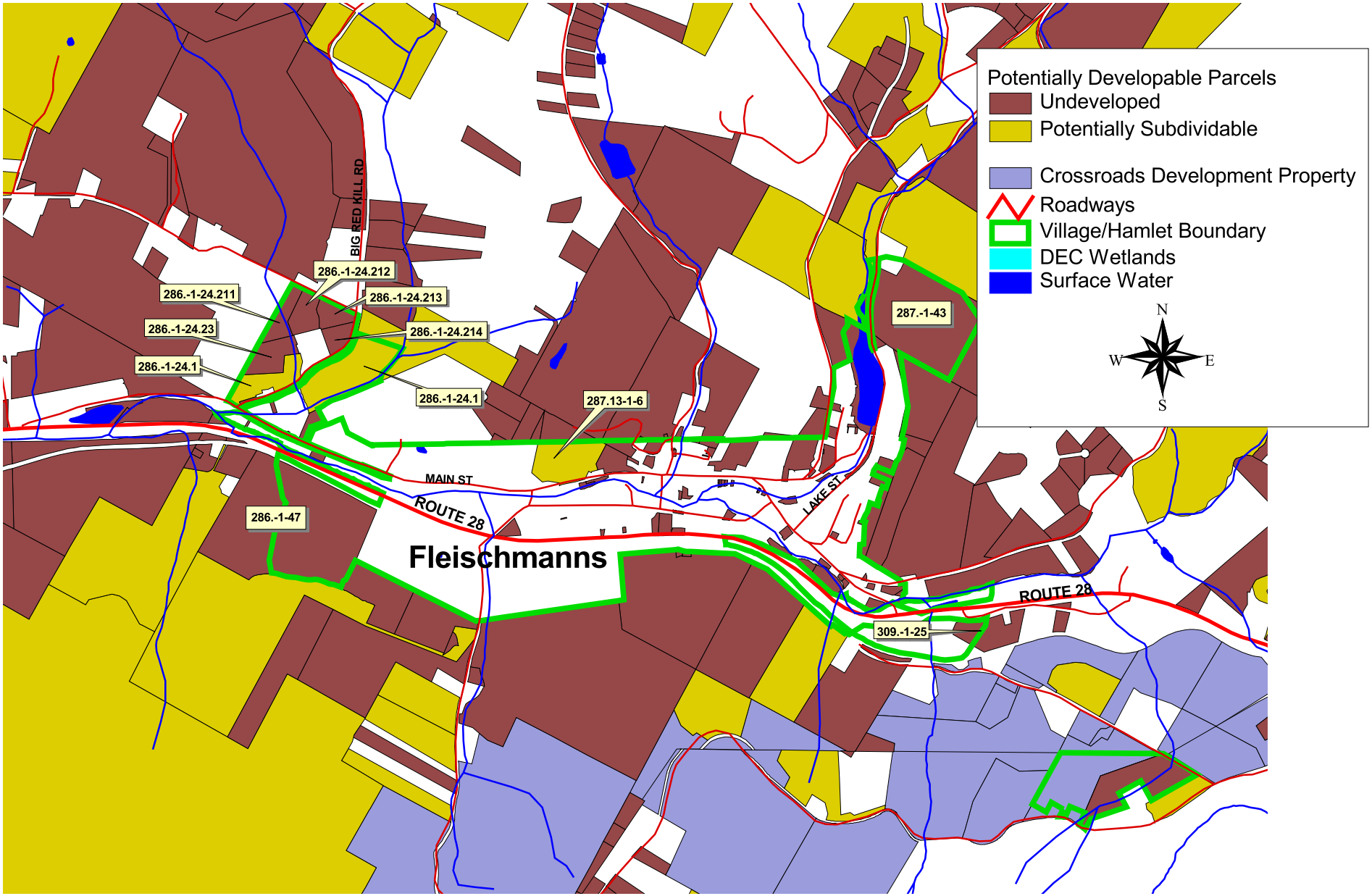
Figure 7 Development Potential - Margaretville/Arkville



Source: NYC Department of Environmental Protection
Prepared by RKG Associates, Inc. - January 2004

1 0 1 2 Miles

Figure 8 Development Potential - Fleischmanns

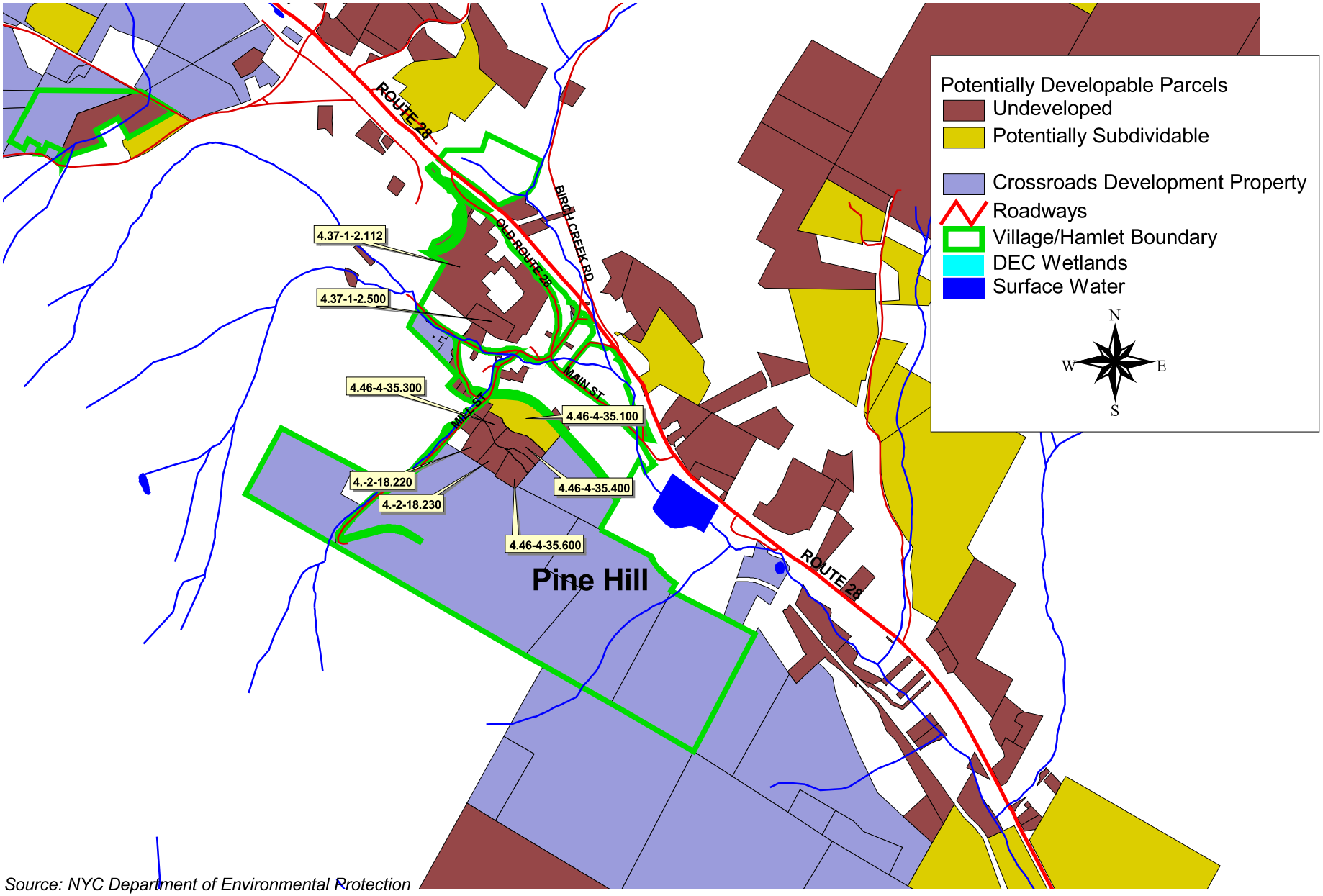


Source: NYC Department of Environmental Protection
Prepared by RKG Associates, Inc. - January 2004

1 0 1 2 Miles

Figure 9

Development Potential - Pine Hill



Source: NYC Department of Environmental Protection
Prepared by RKG Associates, Inc. - January 2004

1 0 1 2 Miles

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Project Technical Memorandum

To: Kate Demong, NYCDEP – OEPA
CC: J. Donohoe
Subject: Crossroads DEIS Review -Deliverable B.4 – Mapping of Developable Land
Date: January 27, 2004

Introduction
In accordance with our contract, we have completed a review of the developable lands within the regional study area. This Technical Memorandum provides a more in-depth review of the methodology and major findings related to determining how much land may potentially be available to support future development within the primary study area towns of Andes, Middletown, Shandaken, and Olive. Particular emphasis was placed on examining properties located along the Route 28 corridor, as well as those that have access to a municipal sewer system, since these are considered to have a greater potential for being developed in the future for commercial or high-density residential uses. The analysis relied heavily on the use of a Geographic Information System (GIS) to examine a variety of regional land based and natural resource data sources that were considered appropriate for completing the required task.

Data Sources
All GIS data layers used in this analysis were obtained from the NYC Department of Environmental Protection's (DEP) GIS Coordinator from the Bureau of Water Supply, Watershed Lands & Community Planning. Data sources for individual layers provided by that office include the following.

New York State Office of Real Property Services (ORPS) – Tax parcel maps and associated property data for tax year 2000-2001.

U.S. Geological Survey (USGS) –Slope maps were created by the NYCDEP based on digital elevation models obtained from the USGS.

Soil Conservation Service (SCS) – Digital soils mapping and soil characteristics cited in this analysis were compiled by the NYCDEP based on original soils maps prepared by the SCS.

NYS Department of Environmental Conservation (DEC) – Regulated wetland areas were delineated by this agency and revised as of November, 2001.

Federal Emergency Management Agency (FEMA) – Floodplain areas depicted in this analysis were created by NYCDEP based on information obtained from FEMA.

Methodology for Identifying Developable Land

Determining development potential within the four town, primary study area was conducted through the use of a Geographic Information System (GIS). Through use of the GIS we were able to conduct overlay and proximity analyses with a variety of information that would not otherwise have been feasible, given the extent of the study area and the nature of the information being evaluated.

The methodology used for identifying areas within the study area which are potentially developable was essentially a two step process. The first involved the use of the tax parcel GIS

layer and its associated property information database. The tax parcel layer illustrates the approximate location and boundaries of all real property within the study area. The database, which is linked to the GIS layer by means of a common identifying data field, contains an array of information about each parcel, such as acreage, location, owner, value, use, etc. Therefore, the map and the database can be queried simultaneously to identify specific characteristics of all parcels in the study area which can then be displayed visually on the map. This was the approach used to identify which parcels within the study area are potentially developable. Once the developable land parcels were selected, they could then be "overlayed" with various development constraint features, such as steep slopes and wetlands, in order to estimate the net developable area that may be available for future development.

Selection of Potentially Developable Land Parcels

Land parcels that were identified as being potentially developable were divided into two categories; undeveloped and potentially subdividable. The initial step of separating the parcels into these two categories was determined by means of the Property Type Classification Code[1] (also referred to as the Use Code) which is contained within the GIS property information database. These use codes divide all properties into nine major categories based on their current use (such as residential, commercial, agricultural), and also identifies whether they are developed or undeveloped. Based on this classification system, appropriate use codes were selected from the database to establish which of the parcels in the study area are undeveloped.[2] Some agricultural codes were also included (crops only) since these properties are readily converted from their current use to other forms of residential or commercial development. Based on information provided by New York City Department of Environmental Protection (DEP), all undeveloped parcels that are owned by either the DEP or the New York State Department of Environmental Conservation (DEC) were excluded since they are considered to be restricted from future development. Similarly, properties that are subject to conservation easements, or are otherwise considered restricted from further development, based on DEP records, were excluded from the developable lands analysis.

The second category of potentially developable parcels are those that are presently developed but have the possibly of being further subdivided. The selection of developed parcels was limited only to those that have a single family house and are 10 acres or more in size.[3] The 10 acre threshold was selected because zoning standards for minimum lot size in the rural portions of the study area typically require 5 acres per dwelling. Therefore, single family parcels with 10 or more acres could potentially be subdivided to allow for additional development, assuming that other development standards could be met (i.e. road frontage, setbacks, water quality, etc.). It should be noted that the 10 acre minimum was more restrictive when evaluating parcels located in village or hamlet areas where higher densities of development are typically permitted. Although the development potential on parcels that have an existing house is likely to be somewhat less than that of a parcel that has no development, these properties should still be considered as a viable land base that could support some level of future development within the region. In addition, it should be noted that there may also be the potential for further development of land parcels in the study area that have existing commercial or industrial uses. However, it was not considered feasible to make an assessment of this potential for all properties within the regional study area due to data limitations and the possibility of greater site development options for non-residential developments.

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[1] *Property Type Classification and Ownership Codes*, State Board of Real Property Services, State of New York, April 1998.

[2] Property use codes included in the undeveloped category: 105, 120-170, 310-323, 330-341, 380, 910-912.

[3] Property use codes included in the potentially subdividable category: 210, 240, 250, 260, 270.

Evaluating Potential Development Constraints

Potential development constraints considered within this analysis included an array of natural resource features that exist throughout the regional study area. More specifically, these include steep slopes, shallow soils, streams and other surface waters, wetlands, and floodplains. While it can be generally stated that each of these resources represent potential constraints for land development, the type of limitation and the level of restriction varies considerably, a concept which is discussed below. Figure 1 presents a graphic illustration of the extent to which these resource constraints are found within the four town study area.

An overall caveat regarding the constraints mapping should be presented at this point. The natural resources data that was used in the GIS analysis was developed from a variety of source data that is acquired and digitized by a number of State and Federal agencies. How the original data was gathered affects its accuracy and the scale at which it is best displayed. Generally speaking, the most appropriate use of the natural constraints data available for the study area is presentation at the town or regional scale, as opposed to at the parcel level. This is because the data is acquired from sources such as aerial photography, satellite images, or regional field mapping that limits their suitability for site-specific evaluations. For example, the county-wide soil survey, which is the basis for the GIS soils data layer, is well suited for town planning but is not considered accurate enough for siting a septic system. Such a procedure would require a higher intensity survey of the soils on a given parcel. Likewise, the slope mapping is based on an average of the percentage of the slope across a broader geographic area which could vary considerably on a specific parcel of land. Therefore, while the data layers employed within the GIS analysis are considered to be the best available information to complete the task, they should be viewed as presenting average conditions within the study area which would need further on-site investigations to confirm or revise.

Topography – One of the most limiting natural features found within the study area are the steep slopes. These slopes represent potential limitations for installing on-site septic systems as well as concerns related to erosion, sedimentation and other types of environmental degradation. City and State regulations[4] related to the installation of septic systems generally limit the maximum slope to 15%, although up to 20% is permitted under certain circumstances. Septic system installation, as well as most other types of development, are not permitted on slopes in excess of 20%. Based on these factors, a maximum slope of 20% was used as the threshold for determining the net developable area of parcels within the study area that were identified as being potentially developable. It is acknowledged that there will be variation in the amount of development permitted on a site as the slope increases. For example, areas with slopes less than 10% are likely to accommodate a higher density of development than slopes ranging between 10% and 20%. However, given the limitations of the constraints mapping, which were discussed above, it was determined that attempting to differentiate the amount of development that could occur at the sub-parcel level would have well exceeded the accuracy for which this mapping was created.

Soils – Along with steep slopes, soils characteristics in the study area represent the second most limiting factor for development due to the requirements for installation of on-site septic systems. Generally speaking, City and State regulations related to installation of a conventional absorption field to treat wastewater from residential or commercial uses require that four feet of useable soil exist above the bedrock or seasonal high watertable. As illustrated in Figure 1,

[4] *Appendix 75-A Wastewater Treatment Standards – Individual Household Systems,* Part 75, NYCRR, Title 10, Chapter II, and
Design Standards for Wastewater Treatment Works, Intermediate Sized Sewerage Facilities, New York State Department of Environmental Conservation, 1988.

based on the available soils mapping data, this limitation would preclude most of the land within the study area from being developed if access to a municipal wastewater system was not available. There are however, exceptions within the regulations that would potentially allow shallow soils to be used under certain conditions (e.g. through the use of a limited amount of fill). In addition, alternative designs to the conventional absorption field septic system designs may also be acceptable under certain conditions.

Given the fact that on-site soil investigation is necessary to determine suitability for septic system installation, as well as the fact that alternative systems can be used, eliminating all soils within the study area with a depth of less than four feet from being potentially developable for the purpose of this analysis was considered excessive. However, it is clear that the amount of land identified later in this memo as being potentially developable, will be further constrained by the soil's ability to accommodate on-site treatment of wastewater.

Surface Waters – From a regulatory and water quality standpoint, the substantial number of streams, as well as other water bodies, that course through the study area present an additional limiting factor for land development. While runoff into these surface waters is a concern the potential development limitation is related more to crossing the streams, and their associated buffer area, in order to obtain access to various portions of a particular land parcel. Regulatory buffers require a 100 foot setback from streams, rivers, and lakes, and 300 feet from reservoirs. In addition, septic systems cannot be sited within these buffer areas. These regulatory buffers do not apply in designated village and hamlet areas as long as a stormwater management plan is developed.

As illustrated in Figure 1, these buffer areas exist throughout the study area. However, it was not considered appropriate to remove the acreage contained within these buffers from the estimated supply of developable land since it is not a factor in determining the potential density of development on a given parcel. Nevertheless, the existence of these buffers will likely result in a limitation on the total amount of development that might otherwise occur on parcels within the study area.

Wetlands – Wetland areas present another potential development limitation within the study area. However, only specific wetlands areas are regulated by the DEC and these locations have been mapped and are illustrated in Figure 1. While development within these wetlands, as well as their associated buffer areas, is restricted, the total acreage contained within these sites was not considered to be a factor in determining the net developable land acreage within the study area. The same is considered to be true for the National Wetlands Inventory (NWI) wetlands in the study area which are regulated by the U.S. Army Corps of Engineers (ACOE).

Floodplains – A portion of the study area lies within the 100 year floodplain as identified by the Federal Emergency Management Agency (FEMA). As illustrated in Figure 1, this area is confined primarily to the areas adjacent to portions of the East Branch of the Delaware River, Esopus Creek, and other tributaries. Development within the floodplain is typically not precluded by any of the area's regulatory bodies, including the local land use regulations of study area towns. Therefore, the land area contained within the floodplain was not eliminated from the net developable acreage within the study area. However, it is possible that the potential amount of development that can occur on parcels located within the floodplain will be reduced if the cost of engineering the necessary site design alternatives exceeds the value of the proposed development.

Zoning – Along with the natural constraints discussed above, local zoning regulations will also have an effect on influencing the amount and type of development that may occur on the potentially developable land within the study area. Each of the four towns, including the village and hamlet areas, are divided into a number of zoning districts which specify permitted uses,

allowable density, and other standards that must be met in order to receive development approval from the local jurisdiction. While these regulations vary amongst the study area municipalities, there are a number of similarities within the respective ordinances. From an overall perspective, the towns have established zoning districts that are intended to encourage a higher density, mixed use pattern of land development within the villages and designated hamlet areas. The minimum lot size within these districts generally ranges from 15,000 square feet up to one acre, depending on the availability of municipal water and sewer. Outside of the village/hamlet areas, minimum lot sizes typically range between 1.5 acres and 5 acres.

Within all of these zoning districts, a specific designation is assigned to each type of land use (i.e. single family home, apartments, gas station, hotel, etc.) as to whether it is permitted by right or prohibited. There is also a third designation, referred to as a special permit, which allows for other types of land uses if approval is granted by the Planning Board, based on an additional set of site development criteria. It would not be practical to list in this memo all of the various land uses permitted within each of the zoning districts for all four towns. However, from a general perspective the regulations typically permit a broader variety of residential and commercial uses to be constructed within the village and hamlet areas by right and at higher densities. Land uses permitted outside these designated areas also include a variety of commercial and residential uses, however, receiving approval for such uses is more likely to require obtaining a special permit to ensure that potential impacts to the affected area are considered.

Assessment of Developable Land in the Regional Study Area

Using the methodology described above, the amount of potentially developable land in the four town study area of Andes, Middletown, Shandaken, and Olive (also referred to as the primary study area towns) has been estimated. The data is presented at three geographic levels which include: the four town study area; parcels along the Route 28 corridor; and parcels in the village/hamlet areas, especially those districts that have access to a municipal sewer system. These latter areas include Margaretville, Pine Hill, and Fleischmanns. The Route 28 corridor and the village/hamlet areas are considered to be the most likely places for commercial development to occur within the study area. Residential development can occur at all locations within the study area, however, the permitted density of dwelling units, as prescribed by local zoning, is generally higher in the village/hamlet areas, especially if municipal sewer or water is available.

<u>Developable Land in the Primary Study Area</u>
Figure 2-1 illustrates the parcels within the primary study area that are considered to be potentially developable. These include parcels that have been identified as currently undeveloped in the property assessment database. It also includes parcels with a single family house that are 10 acres or larger in size, which are considered to have the potential for further development if subdivided.

The total acreage of undeveloped land in the primary study area is approximately 51,900. The total acreage of land that is considered to be potentially subdividable is approximately 51,200. If a portion of this latter acreage is deducted to allow for the existing house on the property (5 acres per dwelling), the amount of potentially subdividable land in the study area is reduced to approximately 45,700 acres. This represents a combined developable acreage of approximately 97,000 acres within the study area, as summarized in Tables 1 and 2. As illustrated in Figure 2-1, the Town of Shandaken contains the least amount of potentially developable land in both categories. This is primarily attributable to the fact that a majority of the land area is publicly owned and thus, considered undevelopable.

These gross estimates of potentially developable land within the study area were reduced, by means of a GIS overlay analysis, to reflect areas constrained by slopes in excess of a 20% grade. This assessment is illustrated in Figure 2-2. In addition, the acreage of potentially developable land was reduced to reflect the estimated portion of that land area that is affected by this constraint. As shown in Tables 1 and 2, applying the slope constraints reduces the total potentially developable acreage of 97,000 to a net acreage of approximately 42,300, or 43% of the gross figure. The largest decrease occurred in the Town of Shandaken, which was reduced by almost two-thirds, due to the significant concentration of slopes in this community.

Table 1
Undeveloped Acreage in Primary Study Area Towns
Andes - Middletown - Shandaken - Olive

	# Parcels	Total Acres	Acreage with Slopes Less Than 20%	Avg. Lot Size
SHANDAKEN				
Pine Hill	30	72		2.4
Big Indian	4	4		1.7
Phoenicia	47	180		3.8
Chichester	5	7		2.5
Mt. Tremper	3	23		7.5
Allaben	11	157		14.2
Town Remainder	758	8,695		11.5
Town Total	**858**	**9,138**	**2,893**	**10.6**
MIDDLETOWN				
Margaretville	58	73		1.3
Fleischmanns	79	208		2.6
Arkville	30	109		3.6
Town Remainder	1,114	15,060		13.5
Town Total	**1,281**	**15,450**	**7,709**	**12.1**
OLIVE				
Boiceville	18	52		2.9
Ashokan	15	40		2.7
Town Remainder	672	9,527		14.1
Town Total	**705**	**9,619**	**5,282**	**13.6**
ANDES				
Andes Village	36	322		8.9
Town Remainder	787	17,358		22
Town Total	**823**	**17,680**	**7,870**	**21.5**
Study Area Total	**3,667**	**51,887**	**23,754**	

Source: Property assessment database records and RKG Associates, Inc.

An examination of Figure 2-2 reveals that removal of the steeper slopes results in a fragmented appearance of the potentially developable land area. This factor, combined with the need to find suitable locations for on-site septic systems on the remaining unconstrained areas, would certainly limit the amount and density of development that could occur within the study area. However, the net developable acreage of 42,300 acres is still considered to be adequate to support a considerable amount of future growth.

Table 2
Potentially Subdividable Acreage in Primary Study Area Towns
Andes - Middletown - Shandaken - Olive

	# Parcels	Total Acres	Acreage with Slopes Less Than 20%	Avg. Lot Size
SHANDAKEN				
Pine Hill	1	11		11
Big Indian	2	65		32.5
Phoenicia	2	33		16.7
Chichester	-	-		
Mt. Tremper	-	-		
Allaben	-	-		
Town Remainder	132	4,787		
Town Total	**137**	**4,897**	**1,780**	**35.7**
MIDDLETOWN				
Margaretville	3	51		17.1
Fleischmanns	2	73		36.7
Arkville	-	-		
Town Remainder	337	17,358		51.5
Town Total	**342**	**17,843**	**8,346**	**51.1**
OLIVE				
Boiceville	1	12		12
Ashokan	1	15		15
Town Remainder	218	6,236		28.6
Town Total	**220**	**6,263**	**3,837**	**28.4**
ANDES				
Andes Village	8	208		26
Town Remainder	382	22,001		57.6
Town Total	**390**	**22,209**	**10,006**	**56.9**
Study Area Total	**1,089**	**51,212**	**23,969**	
Potentially Available for Development*		**45,767**	**18,524**	

*Represents the total acres less 5 acres for each of the 1,089 existing houses
Source: Property assessment database records and RKG Associates, Inc.

Developable Land Along the Route 28 Corridor

A subset of properties extracted from the primary study area's developable land inventory was examined along the Route 28 corridor within each of the four towns. Parcels along this corridor are considered to have the greatest potential for commercial development given the higher traffic volumes and better access. In addition, zoning along this corridor, particularly in the village and hamlet districts, is more conducive for siting various types of non-residential uses.

Parcels within 1,000 feet of the corridor were selected by means of the GIS. The 1,000 foot threshold was considered a reasonable distance that would be acceptable for a variety of non-residential uses that may or may not require a high degree of visibility from the roadway, but could still be easily reached by means of a relatively short access road. This 2,000 foot buffer around the Route 28 corridor is also more likely to be less restrictive in terms of steep slopes given that it parallels the river valley bottom.

Figures 3-1 through 6-2 illustrate the potentially developable parcels located within 1,000 feet of Route 28 in the towns of Andes, Middletown, Shandaken, and Olive. Once again the parcels have been categorized as either currently undeveloped or potentially subdividable (i.e. they contain a single family house and are at least 10 acres in size). As shown in Table 3, the total undeveloped acreage along the corridor is approximately 6,400 acres, with approximately 4,000 additional acres that is potentially subdividable, representing a gross developable acreage of approximately 10,400 acres. When slopes in excess of 20% are deducted from this gross figure it is reduced to approximately 5,200 net developable acres. Figures 3-1 through 6-2 illustrate the effect of removing steep slopes from the potentially developable parcels along the Route 28 corridor.

Table 3
Potentially Developable Land on the Route 28 Corridor
Primary Study Area Towns

	Undeveloped Parcels			Potentially Subdividable Parcels		
	# Parcels	Total Acres	Acreage with Slopes Less Than 20%	# Parcels	Total Acres	Acreage with Slopes Less Than 20%
Andes	90	1,566	910	30	1,360	473
Middletown	211	2,422	1,172	23	1,922	850
Shandaken	293	2,007	955	34	1,076	459
Olive	95	379	298	11	174	119
Total	**689**	**6,374**	**3,335**	**98**	**4,532**	**1,901**
Potentially Available for Development*					**4,042**	**1,411**

*Represents the total acres less 5 acres for each of the 98 existing houses
Source: Property assessment database records and RKG Associates, Inc.

Development Potential in Margaretville, Arkville, Fleischmanns and Pine Hill

A more detailed analysis was conducted in the village of Margaretville and the designated hamlets of Arkville, Fleischmanns, and Pine Hill because properties in these districts have the potential to tie into municipal sewer systems. This factor is considered to greatly increase the potential for development of these parcels. It is our understanding that the Margaretville/Arkville sewer districts as well as the Pine Hill district currently have excess treatment capacity. The Fleischmanns district however, is at or near capacity but may be expanded in the future.

Table 4 shows the number of parcels, total acreage, and assessed value of the undeveloped parcels within these four district areas. In addition, Figures 7 through 9 highlight the map/lot numbers for some of the larger undeveloped parcels located within the four districts.

Table 4
Undeveloped Acreage in Village/Hamlet Areas with Access to Municipal Sewer Systems

	# Parcels	Acres	Avg. Parcel Size
Arkville	33	153	4.6
Margaretville	52	71	1.4
Fleischmanns	79	208	2.6
Pine Hill	30	72	2.4

Source: Property assessment database records and RKG Associates, Inc.

Two of the parcels in Figure 7 (1-1-54.1 and 1-1-52) are located between the Margaretville and Arkville district boundaries which may limit their potential access to the municipal sewer system. However, their location between these two districts would seem to make them well suited for annexation at some point in the future. In addition, some of the parcels included in this inventory are municipally owned which may preclude them from future development. However, they have been included until such time as their exact status can be determined.