1. INTRODUCTION AND BACKGROUND

The establishment of local municipal Environmental Commissions in New Jersey was made possible in 1968 by the New Jersey State Legislature, when it authorized the formation of "Conservation Commissions". The current name of "Environmental Commissions" was adopted as a replacement name in 1972, when the State legislature amended the enabling legislation to grant expanded roles to these volunteer commissions.

The State Legislature recognized at the time, and it still holds true today, that one of the primary functions of the Environmental Commission is to prepare a municipal Natural Resource Inventory (NRI), more commonly (or contemporarily) referred to today as an Environmental Resource Inventory (ERI). This document is intended to be a factual one, free from opinionated interpretation. The purpose is to identify the presence of natural resources and areas of environmental concern, and to delineate and classify them where appropriate. A certain level of professional interpretation is acceptable, however, as may be necessary to determine the predominance of prescribed characteristics, the cumulative sensitivity of a variety of natural resources as may occur in a particular setting, and/or the particular combination of resources as might characterize or distinguish one locale. The local value of resources may also require a certain level of interpretation in consideration of their frequency of occurrence on a regional basis. Beyond this limited level, however, interpretations could be construed to be statements which reflect local or personal values or biases. It is important to avoid such statements in an Environmental Resource Inventory in order not to devalue the credibility of the factual data.

Utilizing partial funding from the 2011 Sustainable Land Use Planning Grants for Municipalities as administered by the Association of New Jersey Environmental Commissions (ANJEC) and funded through the Geraldine R. Dodge Foundation of Morristown, N.J., the Cresskill Environmental Commission (CEC) authorized the preparation of this ERI. This represents the first comprehensive ERI ever to be prepared for Cresskill, although some general natural resource information was gathered over the past two decades as part of the Borough's master plan efforts. Since the Borough continues to develop with land use alterations and expansions, Cresskill determined that the time has arrived to prepare such an inventory. Land use changes have included the loss of historic sites and open space, as well as the effects non-point source pollution has had on those open spaces that remain.

Cresskill's changing demographics, local development pressures, and periodic brownfield issues both locally and nationally have combined to alter both the public's and the government's perception of environmental significance. Unfortunately, the only natural resource and environmental information readily available to be utilized and relied upon by Borough Boards and the Council is primarily that which has been provided by applicants during their land use development presentations. This information generally includes the Applicant's representations (and in some cases interpretations) of environmental significance. Therefore the need for a comprehensive, updated and readily accessible ERI became apparent.

It is important that this Environmental Resource Inventory not be placed on a shelf in Borough Hall where it would be read and used by only those who seek it out. Rather, this document should be readily available to all those who may derive value from its contents. For this reason, the CEC has authorized the preparation of large scale exhibits of the graphic portions of this ERI, to be mounted and permanently displayed in the Cresskill Council Chambers. Those graphic exhibits are an integral part of this document. In this manner, the information is readily available to all parties to refer to when land use decisions are being discussed and applications deliberated. This document and the large scale exhibits together constitute the Environmental Resource Inventory of the Borough of Cresskill. The entire Borough of Cresskill constitutes the Study Area for this document.

The text describes the importance of each resource, the methodology employed in the determination of its existence and extent, its level of regulatory protection, its location within Cresskill, and its relative level of sensitivity. Where particular resources offer opportunities; or where they may present severe constraints to development, they have been discussed. Furthermore, where a valuable resource is threatened by some type of intrusion; or where one may have already been degraded and remedial actions may be appropriate, these too have been discussed. Finally, resources have been described in terms of their individual characteristics, as well as their value within the context of the overall system of which it may be a part.

The large scale exhibits serve to map such resources as topography, steep slopes, soils, flood plains, wetlands, surface waters, and watersheds. The delineation of these resources is depicted in relationship to the man-made features of the Borough, such as the street system. This mapping is general, and is based on the research of record data, and on-site confirmation to the extent one might expect of a planning study. By no means should this mapping be considered accurate on a site-specific basis. Rather, it should serve as a "red flag", to alert interested parties to the likely presence of valuable natural resources and environmentally sensitive areas in a particular location. This document would then serve as a tool to ensure that the proper questions are asked and hopefully answered in a timely fashion, so that environmental concerns and issues can be considered at the earliest possible opportunity.

2. LOCATION

Bergen County occupies the northeast corner of the State of New Jersey (see Figure #1). Similarly, the Borough of Cresskill is situated in the northeastern portion of Bergen County (see Figure #2). Cresskill is situated approximately 12 miles due north of midtown Manhattan, New York City. Cresskill encompasses approximately 2.1 square miles. The Borough is irregular in shape, appearing somewhat like an east-west oriented barbell, i.e. it is wider in the north-south direction at both its eastern and western ends, and narrower in its central portion. Beginning to its north and moving clockwise it is bounded by the Boroughs of Demarest, Alpine, Tenafly, Bergenfield and Dumont, with Haworth Borough just off its northwestern corner.

The western one-third of Cresskill's land area is separated from the eastern two thirds by the north-south oriented railroad and the Tenakill Brook. Grant Avenue and Madison Avenue represent the only two crossings of these two north-south oriented features. All of Cresskill's municipal boundaries are manmade, i.e. not defined by natural features. Sometimes through tributaries, almost the entire Borough ultimately drains into the Tenakill Brook which flows north into the Oradell Reservoir within the Borough of Closter. Approximately 90% of Cresskill, therefore, can be considered to be located within the Oradell Reservoir Basin, and the entire Borough falls within the Hackensack River watershed.

3. TOPOGRAPHY

A. Importance

The topography of an area, or the three dimensional shape (or relief) of the land, is significant in several ways. Varying topography creates visual interest and spatial definition, and supports a variety of vegetation, habitat and water resources. Varying topography also creates a rhythm to the manner in which patterns of development generally occur, often leading to a hierarchy of public and private land uses. The recognition of these topographically induced patterns can help to create a sense of place as espoused by the New Jersey State Development and Redevelopment Plan (SDRP). On more tangible levels, varying topography usually provides opportunities for more efficient sewage disposal, storm drainage control, and water supply distribution.

B. Methodology

The topography of Cresskill was obtained from the NJDEP's electronic database (see Figure # 3) which provided us with a municipally wide contour interval of twenty (20) feet. The check on this information then was multi-faceted. The topography was further analyzed using the importable electronic version of the Yonkers N.Y.- N.J. quadrangle U.S.G.S. 7.5 minute quad sheet which provided us with the smallest available contour interval of ten (10) feet. The limitation of this format is that it comes with too much extraneous information making it difficult to isolate the topography. We then consulted the hard copy version of the Yonkers N.Y.- N.J. quadrangle U.S.G.S. 7.5 minute quad sheet which also provided us with a contour interval of ten (10) feet. The limitation of this information is that it is available only at the very small scale of 1 inch = 2,000 feet and also includes the same extraneous information. We then discovered a new source of U.S.G.S. information that provides a contour interval of ten (10) feet without the obscuring information, but unfortunately U.S.G.S. has not yet provided this information in a usable format. We have included their map in the Appendix of this ERI. Our final check was to consult a planning level accuracy slope analysis that this consultant prepared for the 1992 Municipal Master Plan Periodic Reexamination for the Borough of Cresskill, NJ.

Given these various sources and limitations, we chose to present the graphic exhibit utilizing the usable NJDEP data, but to provide the written descriptions below utilizing the more accurate U.S.G.S. mapping.

C. Cresskill

The Borough's drainage basins are defined by only one minor watershed ridge line and no major ridge lines (see Figure #4). The minor ridge line arcs eastward and then southward from northwest to southeast. It extends from the Knickerbocker Road/ Lexington Avenue intersection to and south along 11st Street and then projects southward into Tenafly Borough. The remaining western one-third of the Borough to the north and east of that ridge line drops in elevation, primarily from east to west to the Tenakill Brook. A north/ south oriented corridor along the east side of Knickerbocker Road initially drops in elevation to the north towards Demarest Borough before bending east towards the Tenakill Brook. The eastern two thirds of the Borough drops steeply in elevation from east to west from Cresskill's eastern boundary with Alpine Borough down to and just east of County Road, and then continues to drop quite mildly in elevation from east to west for the remainder of the distance to the Tenakill Brook.

These topographic patterns have formed a valley down Cresskill's center which itself gently drops topographically from south to north. This valley is the location of the majority of Cresskill's business land uses. Residential neighborhoods also exist within Cresskill's central valley. The most level plateaus within the Borough occur within Cresskill's central valley, and between Knickerbocker Road and Highland Street south of Grant Avenue to the Tenafly border.

The low point of the Borough of Cresskill is at approximate elevation 25 (U.S.G.S. Mean Sea Level Datum), and is located at the northern terminus of the Tenakill Brook where it leaves the Borough and enters Demarest. Other Borough low points occur intermittently along Piermont Road which result in periodic flooding conditions and hazards.

The high point of the Borough of Cresskill is at approximate elevation 425 (U.S.G.S. Mean Sea Level Datum), and is located at the midpoint of the Borough's eastern boundary with Alpine Borough opposite the Eisenhower Drive and Truman Drive intersection. The highest point in the western portion of the Borough is at approximate elevation 165 (U.S.G.S. Mean Sea Level Datum). It occurs as a north/ south oriented drumlin formation and is located from Concord Street to Highland Street just south of Lexington Avenue. Other high points in the western portion of Cresskill continue south from the highest point towards Tenafly.

In general, the topography of Cresskill varies from gentle and flat in its central portion, to moderately sloping in its western portion, to very steep in its eastern portion. These are a result of the receding glaciers of the last glacial age. These patterns are reflected in the patterns of the arterial waterways, glacial deposits and soil types.

4. SLOPES

A. Importance

The extent and severity of slopes is one of the most critical factors which influence development patterns. Most often, steep slopes are one of the last areas proposed for development. This is because they pose relatively high levels of constraints to the difficulty of construction and to the expense and re-stabilization aspects of development. Steep slopes can be highly erodible and only marginally permeable by storm water, cause rapid storm water runoff, and are difficult to stabilize by vegetative means. They are generally characterized by shallow soils and surficial (visible along the surface of the ground) rock, and frequently by groundwater seeps and erratic geological formations. Because development interests tend to shy away from them, steep slopes frequently support large specimen trees, and a variety of wildlife habitat. Steep slopes are not generally found in areas characterized by wetlands or flood plains. Aesthetically, steep slopes are often visually prominent as a result of their elevation above their surroundings, and this represents a valued aesthetic resource.

At the other end of the spectrum, extremely flat slopes can present other issues. While they present fewer constraints to development, they often have characteristics that inhibit their usage or are worthy of preservation. Flat slopes often present drainage and flooding problems. Frequently they have very shallow depths to seasonally high groundwater. They are the topographic condition that most often supports wetlands. Because of the wetness that is common on flat slopes, the prevailing soils often have poor permeability and drainage characteristics. All of these issues present impediments to usage of their lands.

B. Methodology

The slopes of Cresskill Borough are varied and range from very steep to very flat. In this mostly developed suburb, both extremes present issues within the community, and both can be considered significant. We have adopted the industry accepted threshold of 15% to delineate steep versus non-steep slopes. Flat slopes have not been delineated. The steep slopes of the Study Area of Cresskill were delineated by two methods. First, they were obtained from the soils' slopes classifications that are included in the SSURGO of NJDEP's electronic database for soil types. Secondly, from the topography that was obtained as described in Chapter 3 Topography of this ERI, the steep slopes were then interpolated as a check (see Figure #3).

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Approximately 20 percent of Cresskill's slopes are considered steep, or as discussed above this means they have a pitch of greater than 15%. In common terms, this means a slope of 15 or more vertical units to every 100 horizontal units. These all occur on the eastern and western ends of the Borough. The remaining slopes within the eastern end of the Borough are considered moderate at 10% to 15%. In the western end of the Borough, most of the remaining slopes are moderate, and the rest are considered gentle (less than 10%). All of the slopes in Cresskill's central portion are considered gentle. Cresskill's steep slopes are almost all fully developed as

residential lands and are stabilized either by structures, pavements or landscaping. They do have a moderate potential to be problematic since, as privately owned property, their owners can destabilize them by disturbing them in the process of making improvements. While undeveloped slopes of this magnitude present a constraint to development, they are not often considered to be overwhelming encumbrances. Development on steep slopes of this severity requires some extraordinary engineering techniques, and careful and extensive re-stabilization efforts to avoid environmental degradation, particularly in the vicinity of watercourses and water bodies.

The steepest (15% +) slopes within Cresskill occur:

(1) within Rio Vista on Cresskill's east hill. More specifically, they occur:

   (a) east of Truman Drive near the Alpine border;
   (b) in a corridor from the Truman Drive/Jackson Drive intersection southwesterly to the Tenafly border at the Hoover Drive 180 degree turn;
   (c) a north/south oriented corridor in the center of the development from Truman Drive through Carlson Park and extending to Huyler Landing Road;
   (d) in a convex semi-circular arc from Eisenhower Drive and Kennedy Road across Wilson Drive and Johnson Court and sweeping eastward over Adams Drive; and
   (e) in a narrow arcing corridor between North Pond Road and McGrath Drive, crossing the latter street and extending to the Tenafly border.

(2) in an elongated ring from the intersection of Hillside Avenue and Kennedy down to Lambs Lane;

(3) along the western side of the southern end of Engle Street;

(4) in a very narrow north/south corridor from Grant Avenue south to the Tenafly border, approximately following the alignments of Brookside Avenue and Seventh Street;

(5) in a medium width north/south corridor from the Deacon Place/Clark Street/Holly Lane neighborhood across Brookside, Grant and Lexington Avenues, extending from Jefferson Avenue to Concord Street, across Madison and Magnolia Avenues, and then veering southwest to where 10th Street would extend to the Tenafly border;

(6) in a backwards "c" semicircle extending eastward from Brookside and Grant Avenues, then north along the western side of the Tenakill Brook, and then northwest across Mezzine Drive to Brookside Avenue; and

(7) in an irregular rectangle from the Demarest Borough boundary at Heather Hill Court and Mountain View Road to Beechwood Road and Douglas Drive.

(1) through (3) above are located on Cresskill's east hill. (4) through (7) are located on Cresskill's western slopes.

5. GEOLOGY

A. Importance

The geology of an area can be an important consideration in land use decisions, for it influences the nature and extent of potential land use in several ways. Underlying geology can be a good source of water supply, if a sufficient frequency of fissures or cracks in the bedrock can be found to allow for adequate access into the water table by well drilling. The converse of this is that certain geologic materials, such as sand and gravel, provide a porous subgrade which allows for a rapid recharge of groundwater supplies. When these materials are located over valuable aquifers, they are considered to be of value for the continuation, sustenance and protection of the aquifer. These same materials, however, are prime construction materials, and are valued as fill materials which exhibit strength and stability. Their preservation, therefore, is both of value and difficult to accomplish.

Subsurface sewage disposal capabilities are influenced by geology. A dense substratum can inhibit or prohibit infiltration and thereby preclude natural filtration. At the other end of the spectrum, a severely fissured geology allows infiltration at too rapid a rate, precluding adequate filtration and thereby potentially contaminating groundwater supplies. For the purpose of subsurface sewage disposal, therefore, a moderately porous geology is the most desirable. As this feature pertains to stormwater control, rapid infiltration rates are beneficial since they both replenish groundwater supplies and reduce the need to retain or detain surface runoff waters for the purposes of flood control. From the perspective of retaining water in a reservoir system as is the case in most of Bergen County, a dense substratum is preferred to inhibit the loss of stored water into the aquifer.

The nature and depth of bedrock can influence the stability and cost of construction. Certain low bearing strength geologic formations, particularly the surficial (visible along the surface of the ground) deposits, are incapable of supporting heavy loads, in contrast to the sands and gravels mentioned above. These same surficial deposits vary in terms of their ability to accommodate and absorb the freeze-thaw and expansion-contraction of frost action. Further geological constraints are posed by carbonate rock that has a tendency to dissolve, thereby creating subsurface voids and sinkholes, threatening the stability of development that may occur above.

B. Methodology

The geologic information about Cresskill was obtained from a publication by the New Jersey Geological Survey entitled “Geology of Bergen County in Brief” by Carol S. Lucey, Senior Geologist. It was prepared for the NJDEP Division of Water Resources, Bureau of Geology and Topography, and is dated December 1971.

C. Cresskill

The entire Borough of Cresskill is located within the Piedmont Physiographic Province. This geologic province cuts a swath diagonally across the State of New Jersey from its northeast corner through Mercer County. Not far to the west, situated approximately coincident with the Ramapo River, is the beginning of the Highlands Physiographic Province which follows a similar diagonal path.

The specific formation underlying the western half of the Borough of Cresskill, as well that small minority of Cresskill's eastern half in close proximity to Piermont Road, is known as the Brunswick Formation, which is characterized by deep glacial outwash, or surficial deposits, that were left by the receding glacier. The outwash deposits left by the glacier consist primarily of coarse-grained red sandstone and shales, with some conglomerate. These actions took place during the Triassic Period (180 million to 30 million years ago). During the Wisconsin, or last glacial stage, the receding glacier left deposits of an unsorted mixture of pebbles, boulders, sand and clay, commonly called till. The streams fed by the melting glaciers left deposits of layered and sorted sand, gravel and silt, commonly called stratified drift. Some of this drift formed drumlins (steep sided terraces or flat topped hills). Three or four drumlins are present in Cresskill and all are located in the Borough's southwest corner.

The overwhelming majority of the eastern half of Cresskill's specific geologic formation is known as the Stockton Formation. This formation preceded the Brunswick Formation and is comprised predominantly of medium to coarse grained sandstone and medium to fine grained sandstone. It contains lesser amounts of silty mudstone, siltstone, and shale. In Bergen County there is also some coarse grained sandstone in lower parts with thick beds of conglomerate.

The specific geologic formation of a small area of the very steep slopes adjacent to Alpine Borough is known as the Diabase (intrusives). These form the predominant igneous rock type in New Jersey's Piedmont Physiographic Province. Diabase intrusives are very deep, are resistant to weathering, and are found in high topographic locations.

Within Cresskill, the resultant topography and slopes from these three different geological formations is extremely varied (see Chapters 3 and 4 of this ERI) . The underlying geologic drainage is good on the west side of town, and moderate at best on the east side of town. In most cases on the west side of town, the subsurface drainage moves reasonably well through the outwash. In some cases, however, heavy clay deposits and igneous traprock (basalt and diabase) impede water flow through the subgrade. Surface drainage is carried in a classic system of rivers, tributaries and sub-tributaries with associated flood plains and transitional wetlands. On the east side of town on the other hand, the underlying geologic drainage is inhibited by the dense rock with few interstices and heavy clay deposits. Surface drainage flows rapidly down steep inclines over rock bed channels.

No subsurface sewage disposal systems such as septic systems are known to still exist within Cresskill. If they do exist, however, they are rare and (a) could be expected to have a negligible geological impact, and (b) the percolation rate of the substratum could be expected to satisfactorily cleanse the minimal amount of effluent that might be generated. Cresskill

maintains a public sanitary sewer system that services the entire community. The wastewater is conveyed to the Borough's regional treatment facility at the Bergen County Sewer Authority in Little Ferry. The primary threat to the integrity of Cresskill's geology can be expected to come from improperly controlled industrial discharges. Most commonly in the Northern Valley where industrial land uses are scarce, these contaminants are byproducts of small generators such as dry cleaning establishments.

The Borough also maintains a separate storm water drainage system. Storm drainage is collected in this system and it is conveyed directly into surface waters. The 2004 N.J. Storm Water Regulations require that all N.J. municipalities prepare a Storm Water Control Master Plan. Two of its purposes are for N.J. communities to plan the implementation of contemporary methodologies over time to reduce flooding and improve water quality. Several of these methodologies involve subsurface disposal of storm water, relying on infiltration and percolation through soils and into the underlying geology. These methodologies are not expected to be detrimental in Cresskill in any way. To the contrary, the implementation of infiltration methods of storm water disposal within Cresskill could only serve to replenish and cleanse the groundwater supply, raise the groundwater levels, and support subsurface water supply usages that may be operative in the area. Without such disposal methods, area groundwater users run the risk of groundwater elevations potentially dropping to dangerous levels as compared to their withdrawal well depths, or to have the quality of the available groundwater compromised.

6. SOILS

A. Importance

A knowledge of local soil conditions is important from the perspective of both development and preservation interests. Soil Science is a complex area of study, one which involves the analysis of considerations so numerous that professions have been built around this one subject. This is important to mention in this context, since the considerations discussed in this Municipal Inventory are the primary ones, leaving a myriad of secondary factors to the site specific analyses which should accompany each development proposal.

The Soil Conservation Service within the United States Department of Agriculture has evaluated and rated soils for a variety of uses and characteristics. The uses include woodland management and productivity, recreation, wildlife habitat, engineering, building site development, sanitary facilities, and construction materials. For the purpose of an Environmental Resource Inventory for a mostly developed suburb, it is considered most appropriate to emphasize the building site development uses when evaluating the level of constraints posed by the various soils. These levels can be seen on the Soils exhibit which accompanies this report (see Figure #5). Slight constraints generally mean that the soils are compatible for the intended use. Moderate constraints indicate that there are limitations to the use of the soils for building site construction,

and special considerations will be necessary to adequately accommodate this land use. Severe constraints mean that soils properties are so unfavorable for building site construction that extraordinary measures with significantly increased costs are likely to be required to adequately support this land use. Severe constraints also mean that their disturbance often results in the generation of adverse impacts both on and off site.

Soils can be mineralogical in composition, generally rendering them structurally sound and nutrient deficient. Other soils can have a high organic component, which while favorable for a growing medium and for moisture retention may be too compressible to sufficiently support development.

Soils can be uniform in particle size (sands, silts or clays), and this characteristic generally promotes erodibility. Conversely, a mixture of particle sizes within a soil composition, commonly known as a loam, promotes a "locking together" of soil particles which minimizes erosion potential. The percentages of particle sizes within a soil are called its Mechanical Analysis. Soils with larger particle sizes (sands), or those intermixed with the even larger particle sized gravels and stones, are generally well-drained and can absorb frost expansion due to the interstices (air spaces) between particles. Conversely, smaller particle sizes (e.g. silts and most especially clays) possess a minimum of interstices and are, therefore, moderately to poorly drained and subject to damaging frost heaving resulting from the expansion of water as it turn to ice.

Some soils absorb water well, maintaining their natural volume to a large extent, which is a favorable characteristic for development. Others expand significantly when saturated, having what is commonly known as a high shrink-swell potential, which is unfavorable for development in that it causes unwanted displacement.

Certain soils are deep, providing a favorable environment for construction and septic disposal, while others are shallow offering a more readily available supply of groundwater. Shallow soils generally mean that there is a shallow depth to bedrock. It is within the fissures of bedrock where groundwater supplies are usually found. Shallow bedrock also means that blasting or the ripping of rock may be necessary to prepare land for development, which is not economically desirable.

Soils may exhibit extremes of chemical composition, from both of the highly corrosive ends of the acidity and alkalinity spectrum, to the neutral middle ground of pH levels. Excessive corrosiveness may have an adverse impact upon utilities, foundations, and vegetation.

The depth to water table affects the nature of soils. Shallow depths promote hydric soils which are those often or periodically found to be in an anaerobic (absence of air) state since their interstices are frequently filled with water rather than air. Hydric soils commonly support hydrophytic vegetation, which is discussed in the wetlands section of this Inventory. Deeper depths to the water table promote non-hydric soils, which are aerobic (presence of air within interstices). Non-hydric soils commonly support uplands vegetation. The differentiation of these soil categories can be seen on the Soils exhibit which accompanies this report (see Figure #5).

Certain soils are described as having a high potential for frequent flooding. This description is usually given to low-lying soils with a high water absorption capacity, low porosity and slow permeability. In highly developed areas, these soils have often been disturbed and/or filled in the past for the purpose of site development; but this manipulation may not remove their flooding potential. These soils are not considered hydric, and do not receive regulatory protection.

Soil profiles are made up of several layers, called "soil horizons", the characteristics of which help define the soil type. The top horizon, or surface layer, is usually the topsoil, which overlays the subsoil. Topsoil generally has a high organic composition (4 percent or more by volume). Subsoils are predominantly mineralogical, but can have smaller organic composition percentages. Soils occurring below the subsoil are known as the substratum.

Steeply sloping areas generally possess soils which are shallow, erodible, well drained, non-hydric, and have a deep depth to the water table in all seasons. In contrast, extremely flat areas often possess soils which are deep, often erodible, poorly drained, frequently hydric, and with a shallow depth to the water table. These characteristics are generalities, and exceptions are frequent in both extremes.

B. Methodology

The soils of Cresskill were described in the Soil Survey of Bergen County, New Jersey prepared by the Soil Conservation Service of the United States Department of Agriculture, in cooperation with New Jersey Agricultural Experiment Station, Cook College, Rutgers, the State University; and the New Jersey Department of Agriculture, State Soil Conservation Committee, March 1995 (see Figure #5). The mapping of Cresskill's soils was obtained from SSURGO from the NJDEP's electronic database.

C. Cresskill

To understand the properties of soil types in generalized locations is to understand how they were formed. A review of the geology of Cresskill reveals that all of the soils of the western half of the Borough were formed in water sorted deposits. Conversely, the soils of the eastern half of the Borough were formed in glacial till which was typical of the soils in many of Bergen County's more steeply sloping communities. Sorted deposits are more erodible and uniform than are unsorted deposits. Unsorted deposits are characteristic of glacial till.

There are five different categorical names of soils within Cresskill. Within them are eight subcategories which are broken down into twenty different soils classifications. The following chart includes rough approximations of the percentages of the Borough's land that they cover. These percentages are for general comparison purposes and should not be relied upon for any other purpose.

Symbol	Soil Classification	% Cresskill Land Area	%	%
BorB	Boonton moderately well drained-Rock outcrop complex, 3 to 8% slopes	*0.5*		
BorC	Boonton moderately well drained-Rock outcrop complex, 8 to 15% slopes	*11.5*		
BorD	Boonton moderately well drained-Rock outcrop complex, 15 to 25% slopes	*3*		
BorE	Boonton moderately well drained-Rock outcrop complex, 25 to 45% slopes	*1*		
	Total Boonton moderately well drained-Rock outcrop complex		*16*	
BouB	Boonton-Urban land complex, 0 to 8% slopes	*6.5*		
BouC	Boonton-Urban land complex, 8 to 15% slopes	*8*		
BouD	Boonton-Urban land complex, 15 to 25% slopes	*4.5*		
BouE	Boonton-Urban land complex, 25 to 45% slopes	*1*		
	Total Boonton-Urban land complex		*20*	
	TOTAL BOONTON SOILS			*36*

Symbol	Soil Classification	% Cresskill Land Area	%	%
DuoC	Dunellen loam, 8 to 15% slopes	*4*		
DuoD	Dunellen loam, 15 to 25% slopes	*6*		
	Total Dunellen loam		*10*	
DuuA	Dunellen-Urban land complex, 0 to 3% slopes	*0.5*		
DuuB	Dunellen-Urban land complex, 3 to 8% slopes	*3.5*		
DuuC	Dunellen-Urban land complex, 8 to 15% slopes	*20*		
DuuD	Dunellen-Urban land complex, 15 to 25% slopes	*1*		
	Total Dunellen-Urban land complex		*25*	
	TOTAL DUNELLEN SOILS			*35*

Symbol	Soil Classification	% Cresskill Land Area	%	%
UdoB	Udorthents, organic substratum, 0 to 8% slopes	*0.5*		
UdouB	Udorthents, organic substratum-Urban land complex, 0 to 8% slopes	*5.5*		
	Total Udorthents, organic substratum		*6*	
UdwB	Udorthents, wet substratum, 0 to 8% slopes	*7*		
UdwuB	Udorthents, wet substratum-Urban land complex	*11*		
	Total Udorthents, wet substratum		*18*	
	TOTAL UDORTHENTS SOILS			*24*

Symbol	Soil Classification	% Cresskill Land Area	%	%
PbuA	Pascack silt loam, 0 to 3% slopes	*1*	*1*	*1*
UR	Urban land	*4*	*4*	*4*

	TOTAL, ALL SOIL CATEGORIES:	***100***	***100***	***100***

The following are descriptions of Cresskill's soil types (classifications). The two most common soil types found within the Borough are known as the Boonton and Dunellen soils covering 36% and 35% of Cresskill's land area.

1. Boonton Soils

Of the 36% of Cresskill's surface soils that made up of Boonton soils, 20% is Boonton-Urban land complex and 16% is Boonton moderately well drained-Rock outcrop complex. Boonton soils are formed in unsorted glacial till. The slopes of the Urban land complex range from undulating to very hilly (95% of its slopes range from 0 to 25%). The slopes of the Rock outcrop complex range from moderate to very hilly (75% of its slopes range from 3% to 15%). Boonton soils are slowly to moderately permeable, moderately well drained and moderately deep. They have a medium surface runoff, are strongly acidic, and are slightly to moderately erodible. The typically have an 8 inch thick dark brown gravelly loam surface layer over top of gravelly loam. Their biggest limitation to development is the existence of a seasonally high water table. In general, Boonton soils can be found on long glacial till ridges and on slightly convex broad till plains. Approximately one half of Cresskill's Boonton soils can be found on the slopes of the western end of town, while the other half is far up on the steeper eastern slopes of the Borough adjacent to Alpine Borough.

2. Dunellen Soils

Of the 35% of Cresskill's surface soils that made up of Dunellen soils, 25% is Dunellen-Urban land complex and 10% is Dunellen loam. The slopes of the Urban land complex range from 0% to 25% with 80% of them ranging from 8 to 15%. The slopes of the Dunellen loam are evenly distributed from 8% to 25%. Dunellen soils are well drained and loamy, moderately deep, highly acidic, and moderately erodible except in hilly areas where erosion potential is high. They also include a small percentage of Urban land and Pascack soils. The lower subsoil and substratum of Cresskill's Dunellen soils contain thick layers of silt and very fine sand that are frequently saturated. The nearly level Dunellen Urban land complex soils are subject to frequent flooding and have a shallow depth to seasonally high water table. The surface runoff rates for Dunellen soils range from slow on the flat slopes to rapid on the steep slopes. Permeability ranges from moderate to rapid. Frost action is considered to be moderate. The Pascack soils inclusions are hydric, and are protected as indicative of the presence of freshwater wetlands. Cresskill's Dunnellen soils can be found at the foot of both the east and west hills, in the more gently sloping areas of town on the outskirts of the business district, and to a lesser extent further up both hillsides.

3. Udorthent Soils

24% of Cresskill's surface soils are comprised of Udorthents. Three quarters of those are Udorthents, wet substratum, with the other quarter being comprised of Udorthents, organic substratum. Over two-thirds of both classifications are Urban land complex soils. The slopes of both the wet substratum and the organic substratum soils range from 0% to 8%. The Udorthents have all been extensively disturbed to a depth of three feet or more, so the compositions of the surficial soils, as well as their rates of surface runoff, are variable. Udorthent soils are presumed to have been deep, poorly to very poorly drained, and prone to flooding and prolonged ponding. It is presumed that they were formerly wetland soils prior to their manipulation. Since they have been extensively disturbed, they no longer enjoy regulatory protection, as do hydric soils. Their substratums are mostly impermeable. The wet substratum Udorthents - Urban Land Complex soils can be found on low lying marine deposits, upland stream terraces, and flood plains. The organic Udorthents can be found on low lying marine and estuarine deposits. The wet substratum Udorthents can be found on upland stream terraces, drainage ways, and flood plains. The greatest concentrations of Udorthents within Cresskill are in the valley along both sides of the Tenakill Brook, and to lesser extents up near Knickerbocker Road to the west and Hillside Avenue to the east.

4. Urban Land

The soils known as Urban Land cover approximately 4% of Cresskill's land area. Slopes are gently sloping or level. This land has been so disturbed as to be unclassifiable. It has been extensively developed, and usually paved with impervious materials, resulting in a very rapid surface runoff. They can be found within and on the sides of broad outwash plains or stream terraces. The largest concentration of Urban Land within Cresskill can be found within the Borough's central corridor paralleling the railroad. A small isolated area of Urban Land is present at the Camp Merritt circle; and two other small areas are spotted in the southeast corner of the Borough. Dunellen soils are well drained and loamy, very deep, and highly acidic. They are generally moderately erodible, except in hilly areas where erosion potential is high, and in nearly level areas where it is slight. The lower subsoil and substratum of Fair Lawn's Dunellen soils contain thick layers of silt and very fine sand that are frequently saturated. The surface runoff rates for Dunellen soils range from slow on the flat slopes, to rapid on the steep slopes. Permeability ranges from moderate to rapid. Frost action is considered to be moderate.

5. Pascack Silt Loam Soils

The final primary soil type within the Borough, found in approximately one percent of Cresskill's land area, is the hydric Pascack silt loam. Its slopes range from 0 to 3%. It is nearly level and somewhat poorly drained. These soils are generally found in the outwash terraces of the streams. In Cresskill, the one location they can be found is in the area of Legion Place between Broadway and Palisade Avenue. The soil consists of silty and sandy mottled loams. Small percentages of this complex include very poorly drained and hydric Adrian and Preakness soils. Pascack silt loams have moderate to rapid permeability, and medium to slow surface runoff. They have a slight erosion hazard, are strongly acidic, and

have a high frost action potential. The seasonal high water table can be found within 6 to 18 inches of the surface. Pascack silt loams are protected by the New Jersey Department of Environmental Protection by the Freshwater Wetlands regulations. In Cresskill, however, the Pascack silt loam soils have all already been fully developed and no longer enjoy that protection.

7. FLOOD PLAINS

A. Importance

The Flood Plain describes the land which serves to temporarily accept excess waters caused by rain storms. Flood plains are generally broad and flat, and are associated with arterial waterways which contain their waters within their banks under normal rainfall conditions. Flood plains provide the "elbow room" to temporarily control flood waters and minimize excessive flood water elevations during intensive events. When flood plains are encroached upon, flood water storage capacity is often reduced, flood water elevations are raised, and the likelihood of property damage and human injury can be greatly increased. Furthermore, hydraulics and hydrology are accepted as inexact sciences, and consequently the full impact of an encroachment cannot always be accurately predicted. For example, flood plain encroachments can cause damage in the immediate vicinity of the encroachment, as well as downstream by virtue of elevated water surfaces and reduced detention volumes and times of concentration. Beyond this, flood waters can also rise upstream as a result of an encroachment, due to the constriction of what previously was an adequate outfall.

Because flood plains are often and most desirably undeveloped, they frequently support vegetation which can survive periodic inundation, detain and reduce the velocity of flood waters, and filter silt and particulate matter from the storm water. These functions serve to lengthen the discharge time period. This generally reduces the risk of a large slug of destructive flood waters, and cleanses the water thereby improving water quality and mitigating against downstream water quality degradation. Flood plains become part of the aquatic ecosystem, providing much in the way of wildlife habitat. Finally, due in part to the limitations on the land uses which they can support, flood plains offer vast recreational opportunities. Active recreational fields can be developed within flood plains since their presence does not compromise the functions of the flood plain, and because field usage is infrequent during storm events. Benign passive recreation can also take place within flood plains for similar reasons.

A flood plain consists of the floodway, the floodway fringe, and flood plains of varying theoretical storms. These are distinguished from one another by the frequency with which a storm causing flood waters of that magnitude can be expected to occur (e.g. once every 100 years; once every 500 years; etc.). The generally recognized values of flood plains have caused them to be regulated by the NJDEP via the Stream Encroachment Permit Process. Furthermore, since flood plains are oftentimes coincidental with the most sensitive of surface waters (known as C1 waters by NJDEP), they receive additional protection via the stringent 2004 New Jersey Stormwater Regulations buffer requirements for these waters.

B. Methodology

Mapping of flood plains has been completed by the Federal Emergency Management Agency (FEMA) on Flood Insurance Rate Maps (FIRM), which are not considered to be comprehensive on a site specific basis. The latest FIRM information is included on the NJDEP electronic database which was used for this ERI (see Figure #6).

C. Cresskill

During the 1990's the State of New Jersey Planning Commission prepared and enacted the following publication: Communities of Place: The New Jersey State Development and Redevelopment Plan (State Plan, or SDRP). It makes strong recommendations with regard to flood plains. This plan is about to be replaced by a new State Plan and the flood plain recommendations are expected to be even more protective. In the discussion concerning Water Resources, the Plan recommends that development within flood hazard areas be prohibited, and further that some of the existing development situated within flood plains be acquired in order for its land to revert back into the flood plain. These recommendations contributed to the creation of New Jersey's Blue Acres program whose purpose is to acquire flood prone properties, demolish their structures, and return them to flood plain elevations. The SDRP goes on further to endorse some of the recommendations of the April 1982 New Jersey Statewide Water Supply Master Plan and its more recent Updates by recommending higher standards for the control of storm water runoff within watersheds than might otherwise be required.

Both of these documents are advisory rather than regulatory. However, for the first time in 2004 the State adopted the N.J. Stormwater Regulations which contain stringent regulations regarding both flood control and the protection of water quality, both of which directly affect flood plains. Cresskill has suffered from flooding far too often in recent years as a result of development within and upstream of its flood plains. To the best of our knowledge, the only case of Cresskill successfully employing flood plain management tools such as the NJDEP Green Acres program for the preservation of flood plain lands was for the soccer field at the Third Street Park, and the objective there was for recreation as much if not more than for flood control.

Cresskill's three flood plains overlap one another in the area of north Piermont Road. This causes the identification of which brook is overflowing into its flood plain to be difficult to discern. Flood plains within Cresskill can be found associated with the following water bodies and waterways (see Figure #6):

1. The Tenakill Brook. The Tenakill Brook bisects the Borough from north to south from town line to town line. It has a far reaching 100-year flood plain and a very limited 500-year flood plain. The 100-year flood plain is most extensive in its northern reaches. To the west it extends to Pierce Avenue at the northern end of the Borough, and then gradually narrows down to a tightly confined band near Grant Avenue. A very small finger extends further to the west at Cresskill's northern boundary to Holly Lane. With one limited exception, its 100- year flood plain to the east side of the northern reaches extends all the way to the railroad tracks. The 100-year flood plain is much more confined in the Borough's southern reaches. In general it extends from Tenakill Road to Grant Avenue north of Madison Avenue. South of Madison Avenue and extending to the Tenafly Borough border, the 100-year flood plain covers almost all of the Third Street Park recreation complex, the swim club, and most all of the Daibes Park multi-family housing development. Cresskill's 500-year flood plain is confined to an extremely narrow band along the edges of the 100-year flood plain. This is an indication that, within Cresskill, it is quite apparent that the nearby properties have been dramatically disturbed and developed and the Tenakill Brook's flood plain manipulated and contracted.

2. The Cresskill Brook. The Cresskill Brook's southern side 100-year flood plain extends from Grant Avenue, to Margie Avenue and Piermont Road, and then northeasterly to the Demarest boundary just west of Rose Street. With four small and isolated higher elevation areas above flood elevations, its northern side 100-year flood plain extends to the Demarest boundary. The Cresskill Brook's 500-year flood plain is almost non-existent as this residential neighborhood has been extensively manipulated for the purpose of development.

3. The Demarest Brook. The 100-year flood plain of the Demarest Brook merges into the other two flood plains to become one large flood storage area to the detriment of residents within the neighborhoods. To the north it extends approximately to Meadow Street. To the south it extends to the rear property lines of the homes along the northern side of Morningside Avenue west of Piermont Road.

8. FRESHWATER WETLANDS

A. Importance

The U.S. Fish and Wildlife Service defined freshwater wetlands for the purpose of their regulation by the U.S. Army Corps of Engineers (the Corps). They also mapped and classified the nation's wetlands, and this information is available on the National Wetlands Inventory maps (NWI). This project was performed for New Jersey from 1982 to 1984.

Since that time, on July 1, 1988 the NJDEP attained co-permitting jurisdiction over freshwater (or inland) wetlands, along with the Corps. The State of New Jersey adopted the Federal wetlands definition with few modifications. This deliberate redundancy was done for the purpose of ultimately taking responsibility for the Federal program, which if successful would result in sole jurisdiction being awarded to NJDEP. This was accomplished in January of 1994 when New Jersey became the second State in the nation (Michigan was the first) to achieve such status. The entitlement granted by this jurisdiction is the right to grant and/or deny permits for work in or adjacent to wetlands. NJDEP has now completed its mapping of New Jersey's wetlands. The Bergen County maps became available to the public in the fall of 1993.

The Federal definition of wetlands is as follows:

> "Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes, (2) the substrate is predominantly undrained hydric soil, and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year."

The definition of hydric soils is located in the Soils chapter of this Inventory. Hydrophytes, or hydrophytic vegetation, are defined as "any plant growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content".

Hydrophytes are members of one of four classifications:

1. Obligate (essentially always found in wetlands, greater than 99% of the time);

2. Facultative wet (usually found in wetlands, 66% to 99 % of the time);

3. Facultative (sometimes found in wetlands, 33% to 66% of the time); and

4. Facultative upland (seldom found in the wetlands, less than 33% of the time).

NJDEP modified the definition to state that, in most cases, all three of the above parameters must be met to be deemed a regulated wetland. This means that some wetlands under the federal definition that would have been regulated by the Corps would not be regulated by New Jersey. Offsetting this reduction in regulation, however, the NJDEP enacted more restrictive regulations governing activities in or adjacent to wetlands than is utilized by the Corps. For example:

> 1. In contrast to Corps regulations which do not apply to wetlands smaller than one acre, the New Jersey regulations have no minimum size threshold smaller than which a general permit would automatically be granted. New Jersey does have a limited general permit process similar to the Corps process however;

2. Excavation (removal) in addition to deposition (filling) of wetlands is regulated by New Jersey. The Corps only regulates deposition. This is an enormous difference since drainage basins and other elevation reducing activities would not be regulated by the Corps;

3. Transitional Areas (buffers) are required to be preserved around most wetlands, varying in width depending upon the relative level of sensitivity, or their "resource value". In order to make this determination, a classification system has been established wherein wetlands can be classified as either Exceptional Resource Value (requiring a 150 foot buffer), Intermediate Resource Value (50 foot buffer), or Ordinary Resource Value (no buffer required). The Corps requires no buffers, meaning that disturbance involving fill can take place right up to the edge of Corps wetlands without any requirement for a permit;

4. In New Jersey, there is a presumption that a practicable alternative to the proposed wetlands-disturbing action exists that would have less of an adverse impact on the wetlands; and the onus is on the Applicant to refute this to qualify for a permit. The Corps has no such presumption;

5. In the case of an Exceptional Resource Value wetland, the Applicant must demonstrate that there is a compelling public need for the project which is more important than the desire to preserve the wetland; or that denial of the permit application would present an extraordinary hardship peculiar to the project; and

6. Mitigation (the creation of new wetlands or the improvement of despoiled existing wetlands) is an acceptable practice in some cases, with specific guidelines established for compliance. A mitigation bank has also been established to receive contributions in lieu of on-site mitigation, for sites where mitigation is either impossible or undesirable.

Wetlands serve a variety of functions, including flood control, erosion control, preservation of water quality, provision of habitat and migratory rest area, groundwater recharge, recreational opportunities, environmental education, and aesthetics. The following is a quotation from the NJDEP Division of Coastal Resources, dated July, 1988:

"Once considered to be wastelands with little or no value, wetlands are now considered to be a vital link in human and natural ecology. Wetlands provide many important benefits including pollution filtration, flood water storage, soil erosion and sediment control, habitat for fish and wildlife, timber production and shoreline stabilization. They also offer unspoiled open space for the aesthetic enjoyment of nature as well as recreational activities such as hiking, fishing, hunting, photography, and environmental education. Wetlands provide valuable habitat for endangered and threatened wildlife and vegetation.

"Wetlands can minimize the damage to downstream property owners by decreasing the velocity of floodwater and acting as a temporary storage basin. When a stream overflows its banks, it spreads horizontally into a surrounding wetlands where the vegetation acts as

numerous tiny barriers temporarily detaining the water.

"Along with controlling the flood waters, wetlands also serve to maintain water quality. They have a "self-cleaning" ability which, if not over-taxed, can filter, or take up, most pollutants from runoff before they enter an adjoining watercourse. In many respects, wetlands function much like sophisticated sewage treatment plants by removing nutrients and other pollutants prior to discharge to a waterway. This is done at no cost to the taxpaying public.

"A wetland acts as a sediment trap for soil erosion resulting from natural and man-induced activities. Increased development along a watercourse can hinder the wetlands capability to trap these sediments. Often special measures need to be taken to decrease the sediment runoff in urbanizing areas. Wetlands provide essential wildlife habitat as well. A large number of animals use wetlands from time to time for breeding, feeding, or refuge. All wetlands function in providing an important source of food for wildlife and represent a critical link in life cycles and food webs."

The wetlands delineations shown on the accompanying drawings (see Figure #6) do not represent accurate delineations. As stated in the Introduction chapter of this ERI, site specific delineations and classifications should be required for any site specific land use proposals. As is conventional for Planning Studies, the scope of this study was limited and did not allow for more accurate delineations.

B. Methodology

Since the NJDEP is the only agency currently having jurisdiction over freshwater wetlands within New Jersey, the illustrated delineations of wetlands were obtained from the NJDEP's electronic database (see Figure #6). The check on this information then was multi-faceted. First, the NWI maps were consulted for consistency. Second, areas indicated as "wet" on the U.S.G.S. Quad Sheets were compared and contrasted to the NJDEP maps. Third, the three parameters which determine the presence of wetlands were then individually examined as another check of the unsubstantiated delineation used in this ERI. These included hydric soils as inventoried by the Bergen County Soil Conservation District, the one-year flood plain as extrapolated from the FEMA FIRM maps (which is indicative of annual inundation), and the limits of the predominance of hydrophytic vegetation based upon spot checked general visual observations. Those areas which meet the criteria of most of the tests generally confirmed the NJDEP wetlands mapping delineated for this ERI.

C. Cresskill

Cresskill has no mapped wetlands on the east hill, the west hill, or the southern end of town. All of Cresskill's NJDEP mapped freshwater wetlands are located in the Borough's north central region. All are associated with one of the three Borough streams and exist within the outwash plains of the Tenakill Brook, the Cresskill Brook, and the Demarest Brook and its southern tributary. All of the Borough's mapped wetlands are either hydraulically connected or formerly hydraulically connected parts of larger systems. It does not appear that any of the mapped

wetlands that exist within Cresskill are naturally isolated. The importance of this finding is that any disturbance proposed for these wetlands would not enjoy the protection of a statewide general permit. More specifically, they can be found:

1. Along the Tenakill Brook:

    a. Along both sides of the railroad tracks at the border of Demarest Borough;
    b. Between the railroad tracks and the Tenakill Brook just north of the high school running track;
    c. Along both sides of the Tenakill Brook from the Demarest border south to Mezzine Drive (extended);
    d. Along the west side of the Tenakill Brook from Mezzine Drive (extended) south to just south of Bergen Terrace (extended); and
    e. Along the east side of the Tenakill Brook from Bergen Terrace (extended) south to Grant Avenue.

2. Along the Cresskill Brook:

    a. South and east of the confluence of the Cresskill and Tenakill Brooks, within the Tenakill Brook North Conservation Area.

3. Along the Demarest Brook:
    a. South and east of the confluence of the Demarest and Tenakill Brooks, southwest of the High School running track;
    b. On the southern and western sides of the houses fronting the west side of Piermont Road south of Meadow Street;
    c. South and east of the Demarest Brook's crossing of the railroad tracks;
    d. Between the railroad tracks and Piermont Road, south of the DPW and north of the rear property lines of the homes along the northern side of the Morningside Avenue cul-de-sac; and
    e. East of Piermont Road opposite the DPW.

None of Cresskill's wetlands have been designated as "Critical Environmental Sites" by Communities of Place: The New Jersey State Development and Redevelopment Plan (State Plan). The State Plan defines CES's as being equal in environmental value to lands of the Environmentally Sensitive Planning Area (PA 5), except that they are smaller in size than the minimum size threshold of one square mile established for a Planning Area designation. Nevertheless, the State Planning Commission has provided the same level of protection for CES's as is afforded to PA 5 properties. Such a designation could have value in protecting valuable natural resources. The nomination would be initiated by the Environmental Commission and endorsed by the governing body during a State Plan review cycle, if another such review cycle takes place. It may not since New Jersey is in the process of a new State Planning initiative.

The wetlands observed within the Borough are characterized by wooded, deciduous hardwood, closed canopy vegetation. A few minor canopy openings can be found, but these are the

exception. These represent the mid-range to drier end of the wetland spectrum; and this observation is not atypical for the developed suburbs of Bergen County. The freshwater wetlands considered to have the highest ecological value are those with open canopies and emergent herbaceous vegetation. This is because such wetlands support and sustain the highest density of habitat and life species than any other environment. Unfortunately, no evidence has been uncovered that any of these of any significance exist or remain within Cresskill. Nevertheless, many believe that due to the predominantly developed nature of Bergen County, all of these wetlands - both open and closed canopy - exhibit an especially high ecological value, as compared to similar wetlands which can be found in more rural areas. This is because their relative rarity, in addition to their documented ecological values, renders these wetlands that much more valuable.

Not mapped by NJDEP are the smaller isolated wetlands, drainage ditches, swales or detention facilities that meet the three parameter NJDEP definition of wetlands. These would all probably be classified (see Chapter 8.A of this ERI above regarding NJDEP's classification system) as Ordinary Resource Value wetlands. It is also likely that most all of those wetlands that are mapped on Figure #6 would be classified as Intermediate Resource Value wetlands. This is notwithstanding the fact that many of the Borough's wetlands have been manipulated and encroached upon, with development existing right up to their edges without the benefit of any transition area. Other wetlands previously received Army Corps of Engineers permits for their manipulation, and much of the disturbance that is evident took place prior to NJDEP taking over wetlands jurisdiction. In each of these cases, however, the severity of degradation has not yet destroyed all of its life; and the value derived from the type of reclamation that utilizes recognized mitigation techniques would be high since most of these cases are integral parts of larger systems. This rationale is presented in this ERI because there has been precedent for classification as Ordinary Resource Value as a direct result of environmental degradation, and such designations are not desirable from ecological preservation perspectives.

The possible exceptions to the above are wetlands within the Tenakill Brook North Conservation Area, particularly those at the extreme northerly end of the Borough adjacent to the Borough of Demarest, some of which could have open canopy emergent wetlands, and some of which could be classified as Exceptional Resource Value wetlands. We have also been advised that one wetland on the High School site associated with the Tenakill Brook has already received this Exceptional classification. This highest level classification was intended to be reserved for wetlands associated with trout production waters, and those used for breeding and nesting by threatened and endangered species. Cresskill has no trout production waters. Additionally, while there may have been sightings of threatened and endangered species within Cresskill, they have not been officially documented within NJDEP (see Chapters #11 Wildlife and #12 Upland Vegetation of this ERI). Furthermore, even if a sighting had been documented, there are no documented breeding or nesting sites for these animal species. This distinction is an important criterion for warranting an Exceptional Resource Value classification. Nevertheless, exceptions to these criteria have been noted within Bergen County, most notably the one cited above on the High School site despite the Tenakill Brook having been determined to be severely polluted. The expectation, however, is that the overwhelming majority of Cresskill's wetlands would ultimately be classified as being of Intermediate Resource Value.

As discussed above in Chapter 8.A of this ERI, the importance of the Resource Value discussion lies in the Transition Area (buffer) which will be required to be maintained around these wetlands. As previously discussed, Exceptional Resource Value wetlands require buffers of 150 feet. Buffers of 50 feet are required to be maintained around Intermediate Resource Value wetlands. Ordinary Resource Value wetlands have no transition area requirement. It should be noted that waivers from these regulations and transition area averaging techniques are frequently approved by NJDEP.

9. SURFACE WATERS, HYDROGRAPHY & WATERSHEDS

A. Importance

Surface waters provide many benefits to man and the environment, some of which include storage area and transportation for storm water, recharge of aquifers, potable water supply, habitats for aquatic species, nesting and resting opportunities for aviary species, recreational opportunities, and aesthetic value. The extensiveness of the values which they offer justifies their protection and preservation.

There are many forms of surface waters, including both water bodies (e.g. lakes, ponds, reservoirs, seas and oceans) and arterial waterways (e.g. rivers, streams, brooks and creeks). In general, water bodies are static, while arterial waterways are dynamic in that their water is always moving through to some other destination. These classifications tell much about the character of the surface water, both in terms of how fragile a system it is, as well as its role within a larger system.

Most often but not always, water bodies have an inlet and an outlet. These features allow water to move through water bodies, although usually at a very slow rate. As a result of this slow movement, water bodies are extremely sensitive to pollution and siltation, and cannot do an adequate job of self-cleansing since the flushing characteristics are minimal. Silt and contaminants which are heavier than water generally settle to the water body's floor and remain there, with no means of escape. This creates adverse environments for bottom dwelling fish, and for the establishment of underwater life-giving vegetation. Contaminants which are lighter than water form a layer on the surface, spreading insidiously to the pond edges, adversely impacting the pond edge vegetation, which is usually considered to be the most environmentally productive vegetation of wetlands regimes.

"Siltation" refers to the deposition of suspended sediments and soil silt particles into surface waters. Silts enter water bodies from upstream or upslope, and settle in the still water to the water body floor. As silt accumulates, the storage capacity of the water body (or volume of water which it contains) becomes reduced. Depending on its depth, as the water body becomes shallower, sunlight may begin to reach the water body floor through the water. These conditions are then favorable for photosynthesis to take place, and this process promotes the establishment of an excess of water body floor vegetation. This excess of vegetation serves to trap an increasing volume of silt, exacerbating the condition described above and creating a vicious cycle. As the water body floor rises, more photosynthesis takes place, and floor vegetation eventually begins to reach the water surface in the form of lily pads and other such vegetation.

This process, known as "eutrophication", can also be caused by other means. For example, eutrophication can be caused by the over-application of nitrogen and phosphorus rich lawn fertilizers which get carried in surface runoff into surface waters, thereby promoting aquatic plant growth. The deposition of organic matter near the water's edge is another prime cause of eutrophication. Grass clippings and leaves leach nutrients into the surface waters as they decompose, further promoting aquatic plant growth. The process can continue until the water body becomes choked off and oxygen deficient. This occurs as a result of a reduction in the available supply of dissolved oxygen due to the overwhelming demand. The water body then degrades, eventually reverting (or converting) into an emergent wetland. While emergent wetlands are valued ecological resources, their inadvertent creation at the expense of open water bodies is not generally encouraged. Other conditions caused by eutrophication include a greater potential for flooding, the destruction of habitat, reduced dissolved oxygen levels, the degradation of the fish environment, and excessively high nutrient content in the water.

Arterial waterways are almost always in motion. Because of the rapid movement of water through waterways, they frequently have a high capacity for self-cleansing. This rapid movement also causes scouring of embankments, especially along horizontal curves of waterways. Unfortunately, scouring also promotes erosion and subsequent siltation. Arterial waterways act as conduits for the transportation of suspended sediments, which are all too often a form of contamination. In some cases, waterways are intermittent, meaning that they flow only during high rain water seasons and remain dry the remainder of the year. Intermittent streams have a very small capacity for stormwater volume and a low tolerance for flooding, and as a result are particularly sensitive to land disturbances which alter their hydrology. When this occurs, erosion usually ensues. The conclusion is that within the world of surface waters, water bodies are usually the "degraded", and arterial waterways are usually the systems which deliver the degrading constituents from varying upland sources.

The sources of pollution which degrade surface waters (as well as groundwater and soils) are classified as either point source or non-point source. Point source pollution is generated from a specific point, e.g. a pipe outlet, a sewage pump station, or an underground storage tank. The remediation of point sources of pollution is an important activity in reducing the contamination of our resources. But this is only a part of the problem.

Non-point source pollution, on the other hand, is rather insidious in that its source can be anything from leaky vehicles traveling along roadways, to chemicals applied to lawns or sprayed

in trees, animal waste, winter road salts, brake pad metals and construction sediments. Because its source cannot be isolated, since in fact it is the collective product of many small sources, non-point source pollution is most difficult to control.

The generally recognized values of surface waters of all types have caused NJDEP to regulate them via (a) the Stream Encroachment Permit Process, (b) the 2004 N.J. Stormwater Regulations which include the stringent regulations regarding C1 (highest anti-degradation level) waters, and (c) the Watershed Protection Act, among other programs.

B. Methodology

The methodology employed for the Inventory of Cresskill's surface waters, hydrography and watersheds included their mapping from record data obtained primarily from the NJDEP electronic database. As a check, we inspected the Yonkers N.Y.-N.J. U.S.G.S. 7.5 minute quadrangle sheets (see Figure #'s 4 and 6). Also consulted were 1980 aerial photographs obtained from the Bergen County Department of Planning and Economic Development, Google Earth aerial photography, and NJDEP freshwater wetland maps. This information was then generally verified in the field by personal observation. We also consulted culled information from the Rutgers water quality study of the Tenakill Brook cited below.

C. Cresskill

As discussed in the Importance section above, surface waters refer to both static water bodies and dynamic waterways, but in both cases the water table reaches the earth's surface. This distinguishes surface water from groundwater. Wetlands are the transition area between these two classifications. Hydrography refers to the study of the types and behaviors of surface waters. Watersheds refer to defined geographic areas that ultimately drain into particular surface waters, generally separated by topographic ridges. A watershed may also contain multiple sub-watersheds that drain into the tributaries of the main surface water prior to arriving at their next surface water.

With the exception of the one primary brook (the Tenakill) and the two tributary brooks (the Cresskill and the Demarest) that drain the overwhelming majority of Cresskill from south to north towards the Oradell Reservoir, surface waters within the interior of the Borough do not make up important features of Cresskill's landscape (see Figure #6). The two tributary brooks generally flow from east to west. Both tributary brooks have a sub-tributary that flows from south to north. The Tenakill Brook is an important regional arterial waterway; however it does not play a prominent role in Cresskill's landscape other than to drain xcess surface waters. The fact that in large part it is contained within public park lands, there is potential for its recreational role to increase and improve. There are no water bodies of significance within Cresskill.

<u>Water Bodies</u>

There are no notable water bodies remaining within Cresskill. Three manmade ponds are present within the Rio Vista residential subdivision. These were created for storm drainage control as their primary function. They took the place of ponds that formerly existed on the golf course that

previously occupied the site. Additionally, for many years a skating pond existed within Cresskill Park on the Cresskill Avenue entrance road towards the High School. The Borough decided to drain the pond by breaching the outflow structure within the past ten years, so this area is now a grassy field.

Arterial Waterways

As discussed elsewhere within this ERI, all of the arterial waterways within Cresskill eventually drain northward through Demarest and Closter and into the Oradell Reservoir. The Oradell Reservoir itself is one of three on-line reservoirs of the Hackensack River, which itself eventually drains into Newark Bay in the City of Newark. The other two on-line reservoirs of the Hackensack River are the Lake Tappan Reservoir and the Lake DeForest Reservoir. The only significant arterial waterways and their in-Borough watersheds within Cresskill include:

1. The Tenakill Brook. The Tenakill Brook's source is in central Englewood. The Tenakill Brook traverses lightly undulating and relatively flat lands. These features generally result in winding configurations that follow circuitous routes. Because it has been extensively manipulated to fit into the geographic fabric of the developed towns through which it flows, the current configuration of this brook is quite direct and straight. Its entire route never leaves this State or County. It flows for about four-and-one-half miles through the four municipalities of Tenafly, Cresskill, Demarest and Closter on its journey towards the Oradell Reservoir, dropping only about 25 feet in elevation. Its watershed extends slightly further into Englewood. Within Cresskill it flows for about 1.25 miles and drops only about three feet in elevation. Along its route within Cresskill it is joined by the Cresskill Brook and Demarest Brook tributaries.

The Tenakill Brook is one of the most important waterways in northeastern Bergen County. NJDEP has given it its highest anti-degradation classification of C-1, albeit it of non-trout production status. This means that uses for lands within 150 feet of its top of bank in both directions are severely restricted, and within 300 feet are also restricted and considered to be riparian buffers. The Rutgers Cooperative Extension Water Resources Program of Rutgers University published the "Tenakill Brook Watershed Restoration and Protection Plan" dated October 17, 2011 which is available on line. This Plan found the Brook to be severely polluted with bacteria and phosphorus.

2. The Cresskill Brook. The Cresskill Brook's source is in the southern portion of Alpine Borough. The Cresskill Brook traverses down steeply sloping lands within Alpine and eastern Demarest Boroughs, and then down undulating lands through south central Demarest and into Cresskill. It follows a circuitous route through the changing topography and slopes. The Cresskill Brook flows in length for about two-and-one-quarter miles on its journey towards the Tenakill Brook, dropping over 300 feet in elevation. Within Cresskill it flows for only about 0.4 miles across Delmar Avenue, Morningside Avenue, Park Avenue, Piermont Road and the railroad, and drops only about five feet in elevation. Along its route within Demarest it is joined by an unnamed tributary that flows from south to north with its source originating in eastern Cresskill just east of Engle Street.

The Cresskill Brook is an important waterway in northeastern Bergen County. NJDEP has given it its highest anti-degradation classification of C-1. It is of non-trout production status for most of its length; however its uppermost reaches in Alpine Borough are classified as trout production waters.

3. The Demarest Brook. The Demarest Brook's source is in the south central Alpine Borough. Following a similar pattern to the Cresskill Brook, the Demarest Brook traverses down steeply sloping lands within Alpine and eastern Demarest Boroughs, and then down undulating lands through central Demarest and into Cresskill. It follows a circuitous route through the changing topography and slopes. The Demarest Brook also flows in length for about two-and-one-quarter miles on its journey towards the Tenakill Brook, again dropping over 300 feet in elevation. Within Cresskill it flows for only about 0.25 miles across Piermont Road and the railroad, and drops only about three feet in elevation. Along its route within Cresskill it is joined by an unnamed tributary that flows from south to north with its source originating near Cresskill's DPW.

The Demarest Brook is an important waterway in northeastern Bergen County. NJDEP has given it its highest anti-degradation classification of C-1, albeit it of non-trout production status.

Watersheds

The primary watershed within Cresskill is that of the Tenakill Brook and its tributaries. Its official name is the Hackensack River watershed above Hershfeld Brook. This watershed measures 9 square miles in total, and about 1.9 of Cresskill's 2.1 square miles within the Borough. The land uses within this watershed are mostly urbanized. The overall watershed extends to the south into Englewood City and terminates to the north in Closter Borough into the Oradell Reservoir. The watershed extends approximately to the western edge of Cresskill, and to the east it extends up into Alpine Borough. It is situated within Watershed Management Area 5 (WMA 5).

The Cresskill Brook is a tributary to the Tenakill Brook, and therefore its watershed lies within the Tenakill Brook WMA 5 watershed. It extends into Alpine from Cresskill and measures approximately 2 square miles total. Within Cresskill its sub-watershed area measures approximately 1 square mile of mostly urbanized land.

The Demarest Brook is also a tributary to the Tenakill Brook, and therefore its watershed also lies within the Tenakill Brook WMA 5 watershed. It extends into Demarest and Alpine from Cresskill and measures approximately 1.5 square miles total. Within Cresskill its sub-watershed area measures only approximately 0.2 square miles of mostly urbanized land.

The only watershed within Cresskill that is not a part of the Tenakill Brook watershed is known as the Overpeck Creek watershed. Within Cresskill this watershed measures only about 0.2 square miles and is consolidated in the Borough's southwest corner. It is also situated within WMA 5 and is highly urbanized land.

Storm Drainage

The Borough of Cresskill maintains a storm water drainage system that is independent from its sanitary sewerage system. The separation of those two systems favorably distinguishes Cresskill and its neighboring towns from some of New Jersey's older urban areas. Storm drainage surface runoff is collected in this system and is conveyed directly into Cresskill's arterial waterways without any pretreatment prior to its discharge. Cresskill's direct discharge system compares unfavorably with more contemporary methods of storm water discharge. The 2004 N.J. Storm Water Regulations require all N.J. municipalities to prepare a Storm Water Control Master Plan. One of the purposes of this plan is for N.J. communities to plan contemporary water quality pretreatment methodologies for implementation over time so that pollutants aren't carried into the state's open waters through a direct conduit without pretreatment, as has historically characterized the State's systems. This program is intended to minimize the adverse impacts caused by non-point source pollution by filtering out pollutants before they reach open waters.

10. GROUNDWATER & SOLE SOURCE AQUIFERS

A. Importance

Groundwater moves through the geology of an area at varying depths, quantities and rates, and this science is known as hydrology. In wetlands, for example, the depth to the water table, or, in other words, to the top surface of the seasonably high groundwater level, can be zero feet. What this means is that groundwater levels have reached the surface elevations, saturating the underlying soils. In other areas, the depth to the water table can be several hundred feet.

In terms of quantity, where soils are relatively impermeable, air spaces are at a minimum and the relative quantity of water to soil is low. In contrast, where soils are rather porous below the water table, and especially where fractured rock geology exists, the ratio of water to soil particles can be extremely high.

The importance of groundwater is varied. Its depth can determine whether or not subterranean basements can be constructed, and if so the type of footing, foundation and subdrainage system which may be necessary. Depth to groundwater will also determine the general wetness of a parcel of land, with the extreme being the presence of regulated wetlands. Groundwater depth also supports water body elevations.

The depth to groundwater is also a determining factor as to how deep one would have to drill a well to reach an adequate supply of potable water. The flow of the groundwater is another factor

in this determination. The direction and rate of flow is indicative of groundwater source, and hence the reliability of its quality and safe yield. "Safe yield" describes the maximum quantity which can be safely removed from a groundwater source without jeopardizing its quantity or quality. The contemporary terminology for this withdrawal is its sustainable rate. Groundwater quality can be influenced by the potential for salt water intrusion, geologic decomposition, and most often by the percolation of contaminants into the water table. Contaminants may be in the form of volatile chemicals, metals, petroleum products, landfill leachate, raw sewage and salts, among others. The depth to and usage of groundwater resources also influences the acceptability of septic systems for the disposal of sanitary sewage.

With regard to well water for potable and industrial purposes, there are some geographic locations that are completely dependent on groundwater since they have few if any surface water sources from which to impound water such as is done in reservoirs by United Water Resources (formerly the Hackensack Water Company, hereinafter referred to as UWR). Long Island, NY and Cape Cod, MA are two such notable locations. This condition is known as having reliance on sole source aquifers. Fortunately, Cresskill is not such an area.

Because the value of good quality groundwater has been widely recognized, due in part to the deleterious effects of contaminated groundwater on water supply resources and general public exposure, agencies at many levels have promulgated regulations which govern groundwater monitoring and the remediation of its contamination.

Bergen County, which is largely located in the Brunswick Formation of the Piedmont Physiographic Province, has been notorious for its limited groundwater supply. This has spurred the development of extensive public surface water systems for potable water supply. UWR is one of the largest water purveyors, providing water to approximately 1,000,000 people in Bergen, Hudson and Rockland Counties, primarily from surface reservoirs.

B. Methodology

The information regarding Cresskill's groundwater was discerned from the background that supports the geology, soils and watershed information contained elsewhere in this ERI. Since Cresskill does not rely on groundwater for any of its water supply, rendering groundwater of little municipal importance, and since the subjects studied for this ERI were necessarily somewhat limited due to budget constraints, we agreed to not examine the NJDEP electronic database for this feature. All of Cresskill's water supply comes from United Water Resources, and therefore by definition the Borough does not support a sole source aquifer within its borders.

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Depending upon the nature of local soil conditions, groundwater and percolated surface water may move laterally through the soils, rather than infiltrating downward. This action usually occurs when groundwater levels are shallow, and when soils are impermeable or poorly drained. When lateral movement of groundwater occurs, or when the phenomenon of capillary action occurs, groundwater can seep into both surface waters and subsurface water supplies. Therefore, if Cresskill's groundwater becomes contaminated, the potential for it to contaminate the Oradell

Reservoir via the Tenakill Brook exists. The Oradell Reservoir is the source of water supply for the Borough, so this presents a public concern. Lateral movement of contamination could also affect the Borough's wetlands which is also a public concern. Fortunately for Cresskill, its form of sewage disposal is by public sewerage rather than subsurface disposal, so this is not a contributing factor in the protection of the Borough's groundwater supply and wetlands.

United Water of New Jersey (UWNJ) currently supplies Cresskill's drinking water, and has done so for numerous years under various names, including that of the Hackensack Water Company. The primary source of UWNJ's water is from four reservoirs: the Oradell and Woodcliff Lake reservoirs in New Jersey, the Lake Deforest reservoir in New York State, and the Lake Tappan reservoir which overlaps the state line. The quality of this reservoir water has regularly met or exceeded NJDEP and USEPA standards for potable water, although one or more of their parameters are periodically exceeded. When this occurs UWNJ takes remedial actions to bring the water into compliance. These standards were promulgated by The Safe Drinking Water Act (SDWA). The federal Environmental Protection Agency (USEPA) is responsible for regulations for contaminants in water provided by public water purveyors, and the federal Food and Drug Administration prescribes regulations for contaminants in bottled water.

11. WILDLIFE

A. Importance

The health, population, and diversity of species of wildlife within a community are indicators of the health, diversity and quantity of the natural environment within the community. Both an extensive diversity of wildlife species and sustainable population levels indicate the presence of a healthy habitat within which wildlife can thrive. These healthy habitats also represent assets to man in that they provide environments which can promote clean air and water as well as tranquility and recreational opportunities. Furthermore, the presence of wildlife within a community presents educational opportunities. Bird watching and the observing of other wildlife are two of many opportunities to learn about the natural world which exists within and around us.

Certain species of wildlife are classified globally, federally or by the State of New Jersey as rare, threatened or endangered. These three classifications generally indicate that suitable sustainable habitat is scarce; and the implication is that the presence of these species within a community is indicative of the presence of some of this dwindling habitat, which is a good ecological sign. Threatened and endangered species and their habitat are protected by State and Federal laws from harm or molestation by regulation.

B. Methodology

The methodology for determining the presence of wildlife within Cresskill included referencing record data available from a few different sources. Personal observations of actual wildlife, their habitat and their tracks were also included, although none of these sources was very thorough. The organizations providing record data included the Bergen County Audubon Society, the New Jersey Audubon Society, and the NJDEP Office of Natural Lands Management of the Division of Parks and Forestry. The information collected by this latter group is included in the NJDEP electronic database, and locations where threatened or endangered species have been documented are known as Natural Heritage Priority Sites. While the two Audubon groups provide valuable information to the public, in order to protect the wildlife's habitat from human disturbance they do not make it available on a municipal basis. As a point of interest, the Bergen County Audubon Society periodically sponsors an "Audubon Adventures" curriculum which gets scheduled for presentation at a few Bergen County schools during the school year when run. This curriculum assists students in forming positive attitudes towards nature. This County group focuses on the avian species of wildlife. The New Jersey Audubon Society also emphasizes avian species, but addresses other wildlife as well.

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Urban Wildlife

Mammals commonly found in and around Cresskill include a variety of species of what is commonly referred to as Urban Wildlife. These include a variety of species of chipmunk, deer, fox, mole, mice, muskrat, bat, opossum, rabbit, raccoon, shrew, skunk, squirrel, vole, and woodchuck. Bird species are likely to include varying species of blackbird, cardinal, catbird, chickadee, cowbird, creeper, crow, dove, duck, finch, flicker, gnatcatcher, goose, grackle, grosbeak, gull, hawk, heron, jay, junco, kestrel, kingbird, kingfisher, martin, mockingbird, nuthatch, owl, phoebe, robin, sparrow, starling, tanager, thrush, titmouse, towhee, vireo, vulture, warbler, waxwing, woodpecker, wren and Yellowthroat. Common reptiles and amphibians include varieties of bullfrogs, frog, newt, peeper, racer, salamander, skink, snake, toad, and turtles. None of these species are considered rare, threatened or endangered.

Rare, Threatened or Endangered Species

The NJDEP Division of Parks and Forestry Office of Natural Lands Management maintains a policy of not revealing exact locations of sightings of rare, threatened or endangered animal species and wildlife habitat. This policy is intended to protect the valuable sensitive habitat upon which they depend. The Office maintains the Natural Heritage Database and the Landscape Project habitat mapping of all such documented sightings, and provides a listing of species. They do not provide exact location maps for the reasons cited above. The species identified for Cresskill and their statuses are as follows:

Common Name	Scientific Name	Federal Status	State Status	Grank	Srank
Cooper's hawk	*Accipiter cooperii*		T/T[1]	G5[2]	S2[3] B[4], S4[5] N[6]
Northern copperhead snake	*Agkistrodon contortrix contortrix*		SC[7]	G5T5[8]	S3[9]
Red-shouldered hawk	*Buteo lineatus*		E[10]/T	G5	S1[11] B, S2 N
snowy egret	*Egretta thula*		SC/S[12]	G5	S3 B, S4 N
wood turtle	*Glyptemys insculpta*		T	G4[13]	S2

[1] Threatened species - a species that may become endangered if conditions surrounding the species begin or continue to deteriorate.
[2] Demonstrably secure globally; although it may be quite rare in parts of its range, especially at the periphery.
[3] Imperiled in NJ because of rarity (6 to 20 occurrences). Historically many of these elements may have been more frequent but are now known from very few extant occurrences, primarily because of habitat destruction. Diligent searching may yield additional occurrences.
[4] Refers to the breeding population of the element in the state.
[5] Apparently secure in state, with many occurrences.
[6] Refers to the non-breeding population of the element in the state.
[7] Special Concern - applies to animal species that warrant special attention because of some evidence of decline, inherent vulnerability to environmental deterioration, or habitat modification that would result in their becoming a Threatened species. This category would also be applied to species that meet the foregoing criteria and for which there is little understanding of their current population status in the state.
[8] Element ranks containing a "T" indicate that the infraspecific taxon is being ranked differently than the full species.
[9] Rare in state with 21 to 100 occurrences (plant species and ecological communities in this category have only 21 to 50 occurrences). Includes elements which are widely distributed in the state but with small populations/acreage or elements with restricted distribution, but locally abundant. Not yet imperiled in state but may soon be if current trends continue. Searching often yields additional occurrences.
[10] Endangered species - an endangered species is one whose prospects for survival within the state are in immediate danger due to one or many factors - a loss of habitat, over exploitation, predation, competition, or disease. An endangered species requires immediate assistance or extinction will probably follow.
[11] Critically imperiled in New Jersey because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres). Elements so ranked are often restricted to very specialized conditions or habitats and/or restricted to an extremely small geographical area of the state. Also included are elements which were formerly more abundant but because of habitat destruction or some other critical factor of its biology, they have been demonstrably reduced in abundance. In essence, these are elements for which, even with intensive searching, sizable additional occurrences are unlikely to be discovered.
[12] Stable species - a species whose population is not undergoing any long-term increase/decrease within its natural cycle.
[13] Apparently secure globally; although it may be quite rare in parts of its range, especially at the periphery.

Notes:

1. Status for animals separated by a slash (/) indicates a duel status. 1st status refers to the state breeding population, and the 2nd status refers to the migratory or winter population.
2. **Cautions and restrictions on Natural Heritage data**: The quantity and quality of data collected by the Natural Heritage Program is dependent on the research and observations of many individuals and organizations. Not all of this information is the result of comprehensive or site-specific field surveys. Some natural areas in New Jersey have never been thoroughly surveyed. As a result, new locations for plant and animal species are continuously added to the database. Since data acquisition is a dynamic, ongoing process, the Natural Heritage Program cannot provide a definitive statement on the presence, absence, or condition of biological elements in any part of New Jersey. Information supplied by the Natural Heritage Program summarizes existing data known to the program at the time of the request regarding the biological elements or locations in question. They should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments. The attached data is provided as one source of information to assist others in the preservation of natural diversity. This office cannot provide a letter of interpretation or a statement addressing the classification of wetlands as defined by the Freshwater Wetlands Act. Requests for such determination should be sent to the DEP Division of Land Use Regulation, P.O. Box 439, Trenton, NJ 08625-0439. The Landscape Project was developed by the Division of Fish & Wildlife, Endangered and Nongame Species Program in order to map critical habitat for rare animal species. Natural Heritage Database response letters will also list all species (if any) found during a search of the Landscape Project. However, this office cannot answer any inquiries about the Landscape Project. All questions should be directed to the DEP Division of Fish and Wildlife, Endangered and Nongame Species Program, P.O. Box 400, Trenton, NJ 08625-0400.

12. UPLAND VEGETATION

A. Importance

Upland vegetation exists in both undeveloped non wetland areas and in developed and ornamentally landscaped locations. For the purpose of this Environmental Resource Inventory, we shall concern ourselves with only the former, since the latter is often characterized by manipulated and unnatural associations, ornamentals and exotic species.

Undeveloped upland areas themselves provide opportunities for active and passive recreation, as well as habitat for the proliferation and sustenance of wildlife. They often represent the watershed, or head waters, which supply potable water to our drinking water supplies. Activities within upland areas do not have any generic regulatory protection. The absence of this protection, in conjunction with the value associated with upland environments by both preservation and development interests, has spurred large scale protective activities such as the one taking place to the north and west of Cresskill, within the Highlands Physiographic Province of New Jersey and New York (known respectively as the "Highlands" and "Skylands").

Some specific regulations do exist to regulate land use and other activities within uplands. At the State level, uplands which fall within wetlands transition areas are protected by the wetlands encroachment permitting process. Uplands which fall within stream corridors or flood plains are protected by the stream encroachment permitting process. Additionally, if those water bodies are classified as anti-degradation level C1 by NJDEP, the uplands that surround them are further protected by the buffers required by the 2004 N.J. State Stormwater Regulations. Bergen County regulates erosion and sedimentation control of uplands through the Soil Conservation District, which is an arm of the New Jersey Department of Agriculture. At the local level, Cresskill enacted a shade tree ordinance that governs activities pertaining to trees.

The vegetation itself provides a myriad of benefits to man and the environment. Many of these benefits have been discussed to some degree in other sections of this Inventory. To summarize, the benefits provided by uplands vegetation include the building and holding of soil, controlling moisture, cleansing the air, releasing oxygen while absorbing carbon dioxide, moderating temperature extremes, conserving energy, providing homes for wildlife, providing food source for wildlife and humans, buffering or screening views, attenuation of noise, providing aesthetic value, articulation of spaces, moderating bright light, dissipating strong winds, and timber production. It is important to note that most plants serve a variety of purposes. Since environmental conditions rarely exist in isolation, the functions of upland vegetation usually address these conditions in combination with each other, and are, therefore, multi-dimensional in their value.

One of the often overlooked but extremely valuable aspects of vegetation is its location within large contiguous tracts, as opposed to smaller isolated parcels. Vegetation within large contiguous tracts provides significantly more ecological value than does the same acreage isolated into smaller disconnected blocks. The diversity of wildlife increases dramatically with size and diversity of habitat. This is because most wildlife depends on safe cover for breeding, nesting, feeding and resting. These benefits to wildlife are not always available on smaller tracts, especially when they have been "intruded" upon by man. By "intruded" it is meant that the presence of man often represents a threat, thereby eliminating safe cover. Man also frequently clears brush from the forest floor, which is detrimental to wildlife which uses fallen trees, brush and rotting vegetative matter for habitat. Since the ecosystem is comprised of the plant life, animal life, soils, air and water, it can only be sustainable if all of its components are accommodated and in balance. This dependence means that if any one of the components is damaged, the entire ecosystem suffers as a result.

B. Methodology

The methodology for determining the presence of vegetative types within Cresskill included personal observations, as well as referencing record data available from a few sources. These sources included Vegetation of New Jersey (Robichaud, Buell); the NJDEP Office of Natural Lands Management of the Division of Parks and Forestry, which maintains a computerized database of all such findings just as they do for wildlife; and an aged inventory prepared by Cresskill volunteers that was spearheaded by municipal volunteer Frank DeCarlo. As is the case with wildlife, certain species of vegetation are classified globally, federally or by the State of New Jersey as rare, threatened or endangered. These classifications indicate that suitable

sustainable environmental conditions are scarce; and the implication is that the presence of these species within a community is indicative of exceptional quality local environmental conditions, which is a good ecological sign. Threatened and endangered species are protected from disturbance by regulations under State and Federal laws.

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Associations and Generations

The vegetation of the uplands of Cresskill is typical of the northern New Jersey Piedmont Physiographic Province vegetation. General characteristics range from old fields to successional growth to dense forests (see Fig. #6). It varies to some extent as a product of its location, either in valleys, on side slopes or on ridge tops, as well as its orientation to the sun. Forest heights within Cresskill generally range from 50 to 100 feet. Cresskill differs from other Piedmont forests in that we did not observe any successional growth fields.
Natural vegetation has two primary common characteristics - - its succession or change over time, and its diversity or change in spatial composition.

The natural vegetation of Cresskill is almost all at least second generation, meaning that it has been once disturbed or more. Forested areas, therefore, have been through at least one round of complete successional change, having reverted to forest from farm lands, fields, and red cedar dominated successional brush lands. First generation forests have never been disturbed and are rare in Bergen County.

Most of the uplands forests of Cresskill are classified as Mixed Oak Forest of the Mesic North Jersey Uplands. The predominant tree species include red, white and black oaks. Other trees which characterize these areas to a lesser extent include chestnut and scarlet oaks, hickories, red and sugar maples, ash, beech and tulip tree. Common understory trees include dogwood, hop hornbeam and sassafras. Shrubs are dominated by viburnum and spicebush. The uplands forests of Cresskill which populate moist and cooler sites, in ravines or on steep lower north-facing slopes, are classified as Hemlock-Mixed Hardwoods Forest of the Mesic North Jersey Uplands. These forests are dominated by Canadian hemlock[14], which is interspersed to a much lesser extent with sweet birch, yellow birch, basswood, beech, ash, red oak, sugar maple and red maple. There are few understory trees or shrubs; but those that do exist include Shadblow, Black Cherry, Ironwood, Chokeberry, Spicebush, Summersweet, Russian Olive, Grape Vine, and Willow.

There are very few scattered undisturbed stands which are remnants of the once predominant Sugar Maple - Mixed Hardwoods Forest of the Mesic North Jersey Uplands. These forests once existed in abundance in the areas which were the most prime for development, and hence have been extensively stripped of their natural vegetation. Those that do exist are dominated by sugar maple, but also possess significant stands of sweet birch, yellow birch, basswood, beech, ash, red maple, red oak, white oak and tulip tree. Common understory trees include hop hornbeam, dogwood, ironwood and sassafras. The shrub layer is dominated by viburnum and spicebush.

[14] While the Canadian Hemlock (Tsuga canadensis) formerly dominated these forests, they have been devastated in recent years by the Wooly Adelgid, an aphid like bug that has smothered many hemlocks.

To a large extent the biodiversity of Cresskill's upland vegetation has been compromised by the exotic intrusion of non-indigenous species. The degradation of the forest health of Cresskill is representative and typical of that which has taken place within northeastern New Jersey. Air pollution and other forms of non-point source pollution have weakened native species to the extent that more competitive exotic and invasive species have established themselves within the woodlands, and in many cases have out-competed the indigenous species. In Cresskill, some of these invasive species include Winter Honeysuckle, Japanese Honeysuckle, Multiflora Rose, Japanese Barberry, Pachysandra, Norway Maple, Silver Maple, Tree of Heaven, Mulberry, Japanese Holly, Chinese Juniper, Forsythia, and Japanese Yew. This process often leads to the establishment of mono-culture forests which are severely lacking in good quality and habitat diversity. Very little of Cresskill's forests can be characterized as being of good overall forest health.

Rare, Threatened or Endangered Species

The NJDEP Division of Parks and Forestry Office of Natural Lands Management maintains a policy of not revealing exact locations of sightings of rare, threatened or endangered plant species. This policy is intended to protect their valuable sensitive habitat. The Office maintains a computerized database of all such sightings, and provides a listing of species, as well as Index Maps which generally indicate areas where documented locations are known precisely, and where documented locations are known within 1.5 miles. One such map has been provided for the Cresskill region on the USGS Yonkers NJ-NY Quad Maps, because precise locations within the Borough are not known. The map is included in the appendix of this ERI. No such species were identified within Cresskill; however the maps show the locations for some of Cresskill's surrounding communities.

Specific Inventories

In 2003 the Cresskill Environmental Commission initiated a survey of Cresskill's trees on public lands that was conducted primarily by student volunteers in 2004. These were their directions:

Group Number: Supervisor: Cell#

Senior Project – Tree Survey Directions

Purpose:
Cresskill is trying to become a Tree City. This means that they will be able to replace any trees that are removed and additional funds can be generated for planting new trees in Cresskill. The first step in this process is actually surveying the trees that belong to the town.

Getting to your site:
The first thing to do is to drive to the area where the tree survey will take place. The first page of your packet is driving directions. The high school is the green X.

Beginning your survey:
Once you arrive, take out the blown map of your area. You will use this map to direct what streets you are responsible for.

Filling out the sheets:

- You should create one sheet for each street you survey and place the street name on the top.
- You should go for the first tree within 10 feet of the curb.
- Note the address that the tree is located on and if it is a leaf or needle tree.
- Continue this for the entire length of the street that is marked on your map while doing both sides of the street.

Special Scenarios:

- Public Parks or Spaces. Do not bother with them.
- Where you can't tell which property a tree belongs to: Make a judgment call.
- Corner lots: Look at the way the house faces and survey the trees if the house is facing your street.

Good Luck !

Their tabularized findings are as follows:

Street Name	Leaf	Needle
Ackerman Pl	8	
Adams Dr	13	6
Allen St	16	6
Beechwood Rd	27	9
Bergen Ter	21	14
Broadway	57	13
Brookside Ave	134	25
Buckingham Rd	34	1
Burns Pl	28	10
Burton Place	54	17
Carleton Ter	34	11
Cedar St	6	1
Center St	75	26
Cherry Ct	4	
Chestnut st	13	10
Chestnut St	15	
Churchill Rd	69	7
Clark St	24	7
Concord St	109	13
Cottage Pl	9	3
County Rd	74	32
Cranford Pl	7	
Cresskill Ave	36	10
Crest Drive S	51	40
Crest Drive N	126	93
Davenport Ave	16	12
Deacon Pl	11	1
Delmar Av	55	1
Devon Pl		
Devonshire Rd	4	4
Dogwood Ln	13	
Douglas Dr	15	
East Hill Ct	17	17
Eager	4	
Eight St	22	
Eisenhower	170	125
Eleventh St	105	29
Elm St	25	
Elmore Pl	17	1
Elmwood Ter	17	2
Emerson St	24	17
Engle St	115	27
Engleside St	32	35
Esmund	2	2
Evans Rd	36	11
Evergreen Ave	2	3
Fairway Ct	5	9
Fenway Ct	6	2
Fifth St	39	24
Florence Ave	9	
Fourteenth St	18	
Fourth St	19	5
Gilmore Ave	20	23
Glen View Ter	8	
Godfrey Pl	17	
Grant Ave	124	78
Haight Pl	5	1
Harvard St	11	4
Heather Hill Ct	6	5
Heather Hill Rd	27	10
Hemlock Dr	3	2
Highland St	124	38

Hillside Av	173	46
Holly Ln	13	3
Hoover Dr	101	115
Huyler Landing	97	31
Jackson Dr	4	
Jefferson Av	130	116
Johnson Ct	14	15
Kenilworth St	13	3
Kennedy Rd	66	79
Knickerbocker	56	1
Lafayette St	31	24
Lambs Ln	71	50
Lancaster Ct	27	8
Legion Dr	10	3
Lexington Av	94	28
Lincoln Dr	48	6
Linwood Ave	13	5
Loman Ct	24	34
E. Madison	30	16
Madison	274	106
Magnolia Av	80	26
Maple St	20	
Margie Av	76	7
McGrath Dr	46	27
Meadow St	19	3
Merritt Ave	22	
Mezzine Dr	13	7
Milton St	11	4
Monroe Ave	17	9

Milton St		
Monroe Ave		
Monument Pl	12	
Morningside	33	12
Mt. View Ct	19	9
Mt. View Rd	35	2
New ST	27	1
Ninth St	27	
North Pond Rd	74	83
Oak St	42	15
Oxford Pl	20	
Palisade Av	9	3
Palisade Ct	76	43
Park Ave	37	5
Pershing Pl	18	
Phelps Ave	1	3
Pierce Ave	8	
Piermont Rd	195	230
Poplar St	1	1
Prospect Av	10	
Ridge Rd	81	18
Roosevelt St	44	26
Rose St	7	3
Seventh St	82	12
Short Pl	4	6
Sixth St	64	8
Smith Ter	16	
South Pond Rd	50	26
South St	59	5

Spring St	12	
Spruce St	2	2
Stivers St	11	
Stonegate Tr N	10	
Stonegate Tr S	7	
Stonegate Tr E	5	
Stonegate Tr W	9	
Sycamore St		
Tamcrest CC		
Tammy Dr		
Tenakill Rd	11	4
Tenth St	28	
Third St	31	3
Thirteenth St	2	1
Truman Dr	257	243
Twelfth St	130	22
Union Ave	69	6
Vaccaro Dr	21	22
Van Buren Ct	4	11
Washington	8	
Waverly Pl	6	1
Weil Pl	4	1
W. Morningside	2	
Westervelt Pl	84	3
Willis Ave	1	
Willow St	0	0
Wilson Dr	71	42
Woodland Rd	18	7
Wright Pl	9	

Their conclusions were as follows:

1. Cresskill has more trees in 2004 than it had in 1884. This was because trees in the 19th century were cut for farming and fuel.
2. Cresskill has more trees in 2004 than it had in 1974. Trees had been removed for the Rio Vista development, but it was subsequently heavily planted.
3. Cresskill has more trees in 2004 than it had in 1984. The Tammy Brook and Tamcrest golf courses previously had very few trees, but when they were developed with residences they too were heavily planted.
4. Cresskill has more trees in 2004 than it had in 1994. The Daibes Park multi-family development project was also heavily planted.

13. OPEN SPACE

A. Importance

Open space is a precious resource which, with the exception of its size, is not quantifiable in terms of its value. Extensive research has concluded that open space provides for the mental and physical health and well being of human beings, in addition to providing recreational opportunities. Some of the qualities associated with open space include peace, tranquility, aesthetics, and relief from urban and suburban congestion.

Open space also helps to define the sense of place, or unique identity, of a community. The open spaces of a community can create a recognizable vernacular which can be translated into a representation of the standards of the locality, against which proposed alterations to land uses can be measured. Precedent has been set for the usage of this as a yardstick for evaluating projected adverse impacts from development proposals.

As was discussed in the Vegetation section of this Inventory, open space, like vegetation, similarly becomes more valuable in large contiguous tracts. All of the values of open space discussed above become enhanced as parcels grow larger in size. In some cases, long and linear contiguous stretches of open space are conducive to the development of greenways, or linear park corridors within which users may travel, and because of which other larger blocks of public open space and community facilities may be linked.

Open space in and of itself is not protected by regulatory authority, except as it may support other environmentally sensitive functions. There are two other notable exceptions to this rule. First, if N.J. State Green Acres funds were used to purchase or improve open space within a municipality, as is the case within Cresskill, then pre-existing publicly-owned open space cannot readily be the subject of disposition. Secondly and even more rigidly, if open space is zoned or has been dedicated as park land, and in particular if it was included on a Green Acres Recreation and Open Space Inventory (ROSI), it would take an act of the State legislature (the State House Commission) to dispose of it. Lands funded through the Green Acres program are open to the use and enjoyment of all residents of the State. Open space may also be protected by regulations concerning buffers for wetlands, flood plains, open waters, and C1 waters.

B. Methodology

The open spaces of Cresskill were first inventoried in January of 2004 in a document entitled “Open Space and Recreation Plan, Borough of Cresskill” (OSRP). This document was updated in July of 2009. This consultant worked with various groups within the

Borough to inventory all of the open spaces that exist, whether they are dedicated as park land by the Borough or other governmental authority, privately owned, non-dedicated and publicly owned, or Board of Education owned. Desirable open space additions were also identified in this report, and they have since been expanded to include additional privately owned properties that the Borough has targeted for possible acquisition. The OSRP includes the background information that was required for Cresskill's successful Planning Incentive Grant application to NJDEP Green Acres.

Cresskill's Master Plan Revision and Reexamination Report of 2010 reviewed the open spaces and recreation lands in section 3.8.1 Parks, Recreation and Open Space. As a master plan should, it went on further to discuss the details of each property's usage, facilities, strengths and shortcomings, and expressed plans for future improvements. The specific graphic exhibit that was prepared for the Master Plan can be found in the Appendix of this ERI. It includes all of Cresskill's open space and recreation properties (see Appendix: Figure #3 Parks Recreation and Open Space, Cresskill Master Plan, June 2010).

C. Cresskill

As referenced in Chapter 13 section B above, Cresskill's remaining open spaces were detailed in its OSRP document. Excerpts from that Plan that pertain to this ERI as an inventory, as opposed to the action plan that is the objective of an OSRP, have been included in this chapter. Similarly, the master plan discussions that go beyond inventory are not appropriate in an ERI and have been excluded from this document.

There is no zoned open space or park land within Cresskill. Rather, the Borough has placed their parks in the Municipal Use zone along with all other municipal uses (i.e. Borough Hall, Library, Ambulance Corps, Fire House, etc.). Moreover, municipal parks and recreation areas are not labeled as such on the Borough Zoning Map or on the Borough's tax maps. Since the visions or intent the community has for these properties is specifically for parks and recreation, this may prove to be problematic in the future if a movement to dispose of open space arises. Their highest level of protection currently is their inclusion within the Borough's OSRP and on Cresskill's Green Acres Recreation and Open Space Inventory (ROSI). Through the use of deed restrictions the ROSI encumbers properties from being diverted to any uses other than parks and recreation.

Despite no parks or recreation areas being zoned for such uses, Cresskill is fortunate to have at least preserved a moderately sized network of open spaces. Yet these are still inadequate to meet the needs of the Borough as was verified by the OSRP. Cresskill cannot increase these quantities by purchasing undeveloped land because no sizable blocks of privately owned open space exists any longer. The updated 2009 Borough of Cresskill OSRP reports that there are only approximately 1.33 acres of uncommitted open space remaining within Cresskill, all of which is subject to future development proposals. These privately owned properties are shown on the System Map in the OSRP. As a result, the Borough has had to resort to purchasing sites with low quality land uses and converting them for parks and recreation.

As mentioned above, the publicly owned open spaces within the Borough are shown in the Appendix: Figure #3 Parks Recreation and Open Space, Cresskill Master Plan, June 2010. The majority of these open spaces can be found in the Borough's central spine, along the Tenakill Brook. They include the High School fields, Tenakill Brook North Conservation Area, Cresskill Avenue Park, Delmar-Morningside Stream Conservation Area, Margie Avenue Playfields and additions, Station Green, Bryan School Playfields, Waverly Place Park, Tallman House, Carolyn Schultz Playground, and the Borough's main recreation complex in the Third Street Park. Other parks and recreation facilities are scattered about town to the east and west, but in comparison both of these areas are underserved.

The following charts itemize various categories of the Borough's remaining open spaces:

Existing Publicly-Owned Open Space and Recreation Resources

BLOCK/ LOT	SIZE (AC)	TYPE (and Name if appropriate)	LOCATION (see System Map-OSRP	Level of Protection	Form of Ownership
188/9	4.9	Cranford Place Park. Active (1 basketball court & 2 informal playgreens)	Southwest quadrant of Cranford Place & Douglas Drive	Strong*	Borough
140/251	1.7	11th Street Playfield. Active (1 little league field, 1 basketball court, & 1 tot lot)	Surrounded by Magnolia Ave.; & 11th, 12th & Stivers Streets	Strong*	Borough
2/5	2.2	Cresskill Avenue Park. Active & Passive (1 skating & viewing pond)	Northeast quadrant of Cresskill Ave. & Lincoln Drive	Strong*	Borough
175/2	4.83	Margie Ave. Playfield. Active (1 little league field, 2 softball fields, 1 basketball court, 1 tot lot)	Southeast quadrant of Margie Avenue & Piermont Road	Strong*	Borough
176/4	1.8	Ackerman Place Field. Active (2 softball fields, 1 soccer field)	South of Margie Ave., between Ackerman Place & Dogwood Lane	Strong*	Borough
20/8	0.6	Station Green. Passive (1 informal green)	Intersection of Union, Grant and Madison Avenues	Strong*	Borough
180/29, 38 & 56	2.5	Palisades Avenue Playfield. Active (1 basketball court, 1 informal ballfield, 1 tot lot)	Southwest quadrant of County Road and Palisades Avenue	Strong*	Borough
2/8 & 9; 9/1; 2.04/1	13.5	Tenakill Brook North Conservation Area. Passive	West side of Tenakill Brook, north end of Borough	Strong*	Borough
158/11-14 & 55.02; 160/10 &163/14	1.4	Delmar-Morningside Stream Conservation Area. Passive	Stream corridor between South St. and Park Avenue	Strong*	Borough
210/7 – 9, 22	5.6	Eisenhower Drive Park. Passive	North side of Eisenhower Drive west of Hoover Dr.	Strong*	Borough

22/20; 23/1	0.6	Waverly Place Park. Passive	North end of Waverly Pl., west of Tenakill Brook	Strong*	Borough
39/21, 33, 27, 37, 41, 45, 47, 49; formerly 40/4 – 17 (adj. to 41/1.04); 49/559, 603; 50/511, 587; 51/508; 63/950, 961, 969, 973, 981, 983; 64/896, 947; 65/865, 873	15.1	3rd Street Park; including Cresskill Tennis Center, Swim Club & Parking Lot (1 swimming pool, 1 wading pool, 1 tot lot), baseball, soccer, football, picnic area, playground	Along 3rd Street south of Madison Ave. & west of Tenakill Brook	Strong*	Borough
17/12	0.5640	Historic Tallman House on oversized lot, adjacent to Tenakill Brook	5 Cresskill Ave. West side of Station Green, No. of Madison Ave.	Strong*	Borough
73.01/46.01	0.0960	Old dilapidated house was razed. Now a field on site that will expand Margie Avenue Playfield	184 Piermont Road – east of Piermont Road & north of Allen Street	Strong*	Borough
173/89 & 73.01/46	0.6567	Old dilapidated house was razed. Now a field on site that will expand Margie Avenue Playfield	190 Piermont Road - east of Piermont Road & north of Allen Street	Strong*	Borough
4/1 – 4, & 3.01/7	0.6715	Historic Merrifield House on large lot connecting two neighborhoods	43 Merrifield Way – east end of Ridge Road north of Grant Avenue	Strong*	Borough

* Owned and protected by the Borough as permanent open space and/or recreation land, and included on Cresskill's NJDEP Green Acres Recreation and Open Space Inventory (ROSI)

Other Existing Publicly-Owned Open Space and Recreation Resources

BLOCK/ LOT	SIZE (AC)	TYPE (and Name if appropriate)	LOCATION (see System Map-OSRP	Level of Protection	Form of Ownership
2/1	27.7	High School playfields. Active (2 softball fields, 1 baseball field, 3 tennis courts, & 1 football field with track)	North side of High School between RR tracks and Tenakill Brook	Strong*	Board of Education
16/1	6.8	Bryan Elem. School Playfields. Active (2 softball fields, 1 baseball field, 1 basketball court, 1 tot lot)	Northeast quadrant of Brookside and Prospect Avenues	Medium**	Board of Education

* Jointly owned by the Board of Education and the Borough and used for recreation by both the High School and the general public.

** Owned and protected by the Board of Education as recreation land, and erroneously included on Cresskill's NJDEP Green Acres Recreation and Open Space Inventory (ROSI)

Existing Publicly-Owned Undeveloped Lands that are Potential Recreation Resources

BLOCK/ LOT	SIZE (AC)	TYPE (and Name if appropriate)	LOCATION (see System Map-OSRP	Level of Protection	Form of Ownership
91.01/1-10	0.55±	Open Space with stream and woodlands	Intersection of Lambs Lane and Engle Street	Strong*	Borough
83/51 – 65 & 90 – 107	2.8± less Sr. Cits. Bldg. Of 0.2±	Senior Citizens Center; plus stream, flood plain, wetlands and woodlands	Spring Street, Washington Street, and East Madison Avenue	Strong*	Borough

* Owned and protected by the Borough as municipal land, and not included on Cresskill's NJDEP Green Acres Recreation and Open Space Inventory (ROSI)

There are no privately owned open space and/or recreation resources still existing within Cresskill Borough. There are no privately owned swim clubs or athletic or other recreational facilities of any sort that exist within the Borough that are commercially available. One former private golf club, the Tamcrest Golf Club, went out of business long ago. The Cresskill Swim Club is a public facility. The following park descriptions and photographs were prepared by Cresskill's ERI Project Team with assistance from this consultant:

Parks, Recreation and Open Space

Cranford Place Park is bounded on the east by Cranford Place and to the north by Douglas Drive. It measures 4.9 acres in size and is used for both active and passive recreation. It has lawn and shade trees. A basketball court is on its south side, and at its center there is a small playground equipped with slides, swings, and a jungle gym for young children.

Cranford Place Park

Eleventh St. Playfield lies between 11th and 12th Streets and Stivers Street and Magnolia Avenue and provides active recreation. It measures 1.71 acres and contains a baseball field with a scoreboard, a basketball court and a playground equipped with slides, swings, and a jungle gym for young children.

Eleventh St. Playfield

Cresskill Avenue Park provides passive recreation, and is bounded on the south by Cresskill and Grant Avenues, on the east by the railroad tracks, on the west by Lincoln Drive, and on the north by the Cresskill High school property. It is 2.19 acres in size, contains large expanses of lawn, many shade trees and some shrubbery. This park formerly included a skating pond that no longer exists.

Cresskill Avenue Park

Margie Avenue Playfields, and the new Additions to the Margie Avenue Playfields provide active recreation facilities for both the community and the adjacent Merritt School students. The usable playfields measure 4.83 acres, and the new additions add an additional 0.75 acres for a total present park site of 5.58 acres. The park is located in the southeast quadrant of the intersection of Piermont Road and Margie Avenue. A privately owned residential lot and house near the intersection represents an out parcel that partially segments the overall site and isolates the property on the corner, rendering approximately one quarter of an acre negligibly usable. The ball fields are used primarily for baseball, softball, football and soccer. The grass lawns and ball fields are rimmed along Margie Avenue and Piermont Avenue by mature oak and maple trees. The fields are well maintained, however some litter accumulates during high traffic sports games.

Margie Avenue Playfields

Additions to the Margie Avenue Playfields

Ackerman Place Field measures 1.76 acres in size and is located between Merritt Memorial School, the Cresskill Police Station, Margie Avenue and Ackerman Place. It is used by sports teams for field games, primarily soccer. The field is rimmed by mature oak trees, and along Dogwood Lane in front of Merritt School is lined with mature dogwood trees. The field is maintained in good condition; however due to its heavy use by sports teams and its proximity to the school, receptacles for recycling would be of value.

Ackerman Place Field

Station Green and Veteran's Square. Station Green is a passive space bounded on the east by the railroad tracks and on the west by Cresskill and Grant Avenues. To its south is the space known as Veteran's Square that has the potential to become and does function as a town square, but technically it is within the surrounding roadway rights-of-way. Station Green measures 0.57 acres with lawn and a few shade trees. The Board of Education Bulletin board is also installed on its south end and is visible to the passing traffic on Union Avenue. Veteran's Square has an irregular shape and measures 0.34 acres. It is bounded on the east by the railroad tracks; and on the west, south and north by the intersections of Madison, Grant and Union Avenues. It contains several commemorative plaques and is used for the Memorial Day ceremony, speeches and parades.

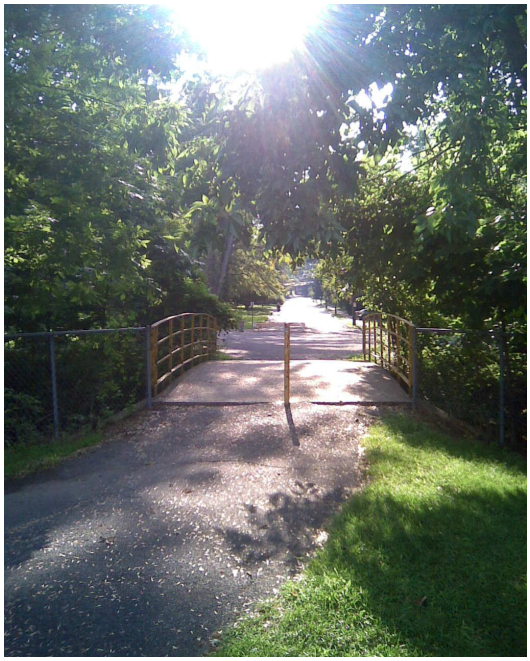
Station Green

Veterans Square

Palisade Avenue Playfield (officially Bertholf A. Terhune Park, or more commonly Terhune Park) is situated between Palisades Avenue and Linwood Avenue on the west side of County Road. This park is 2.49 acres in size. It is oddly shaped which minimizes its utility. A plaque at the corner of County Road and Palisades Avenue states that this park is "named in grateful appreciation for his [Mayor Terhune's] selfless and generous donation to Cresskill as Councilman and Mayor". There is also a smaller plaque embedded in a stone which reads: Kathleen Stevens, with Thanks, Cresskill Garden Club, 1999". The park is equipped with play equipment for a variety of ages. Mature trees within the park include Sweetgum, Black Birch and Maples. There are also invasive species such as Creeping and Climbing Roses and Poison Ivy. Otherwise, the park is a large field of mowed lawn grass. The park is well-maintained with just a few pieces of litter observed. It has a basketball court, a young-child playground with equipment for climbing and sliding, two swings for toddlers, two full sized swings, a park bench and a picnic table. The park is slated for some upgrade in 2012.

Palisade Avenue Playfield (Terhune Park)

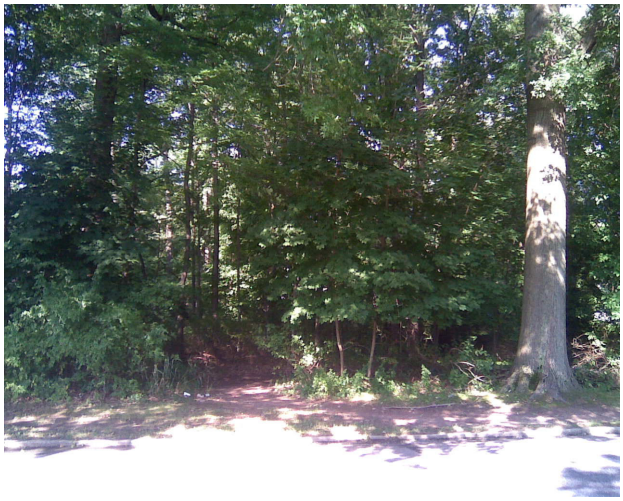
Tenakill Brook North Conservation Area is a long and linear strip of conservation land comprising 13.484 acres. It is bounded on the east by the Tenakill Brook arterial waterway and Lincoln Drive, on the west side by private properties on Pierce and Gilmore Avenues, and on the south by Grant Avenue. The area is accessible from Mezzine Drive via a foot bridge across the Tenakill Brook to the grounds of the High School. It is also accessible from an extension of Deacon Place, about 100 feet north of the corner of Deacon Place and Pierce Avenue. North of Mezzine Drive the area extends about 0.31 mile to the Demarest border. South of Mezzine Drive the area continues for 0.16 mile. The width of the Tenakill Brook North Conservation Area varies from 60 to 250 feet. South of Deacon Place, the area is level and mostly grass which is cut and maintained by the DPW. Some shade trees remain along the Tenakill Brook, making for a pleasant easy walking trail. North of Deacon Place the area is rather swampy and has been allowed to become overgrown with brush and trees. Walking is a challenge in this area. The entire park is within the 100 year flood plain, and much of it has been classified as freshwater wetland.



Tenakill Brook North Conservation Area

The Delmar Morningside Stream Conservation Area is located along both sides of and includes the Cresskill Brook which winds through and bisects the north-eastern portion of Cresskill and flows westerly into the Tenakill Brook. Its eight individual lots along the stream corridor total 1.38 acres. It is densely wooded with a variety of deciduous shrubs and trees running along the length of the brook. There are no groomed trails as the corridor snakes between several private parcels. An occasional bridge crosses the brook, and the

brook itself travels through culverts under five Borough roads. There is evidence of trash that ends up in the brook from storm drains, street runoff and random litter.



Delmar Morningside Stream Conservation Area

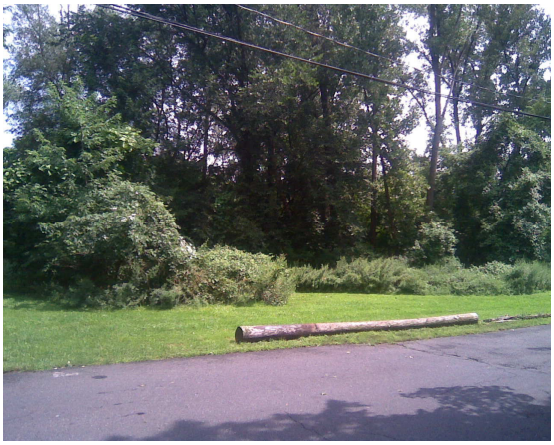
Eisenhower Drive Park (Carlson Park) totals 5.58 acres and is the largest natural park in Cresskill. Its trail head is on Eisenhower Drive on the southwestern side of the park, and on its northeast side there is a second trail entrance from Truman Drive. The surrounding properties are all single family uburban homes and their properties. A plaque at the Truman Drive entrance states that this park is "named in memory of Planning Board member, Councilman and Mayor E. Leonard Carlson who served from 1947 - 1963." In addition to the urban wildlife prevalent throughout the community, hawks were spotted in flight. The forest is deciduous, and the dominant tree species include Tulip Tree, Red Oak, White Oak, Pin Oak, American Beech, and Black Birch. Invasive and intruding exotic species include Poison Ivy, Periwinkle, English Ivy, Pachysandra, and Garlic Mustard. A winding and intermittent stream that is tributary to the Cresskill Brook bisects the park. This park is difficult to maintain, and as a result litter was observed in the stream and on the ground. Some graffiti is also apparent. The park has walking trails that require better maintenance and trail markings. The park features a stone wall and stone bridge which likely were part of a former estate/home that is no longer standing. An abandoned driveway is has become overgrown with trees and vines.

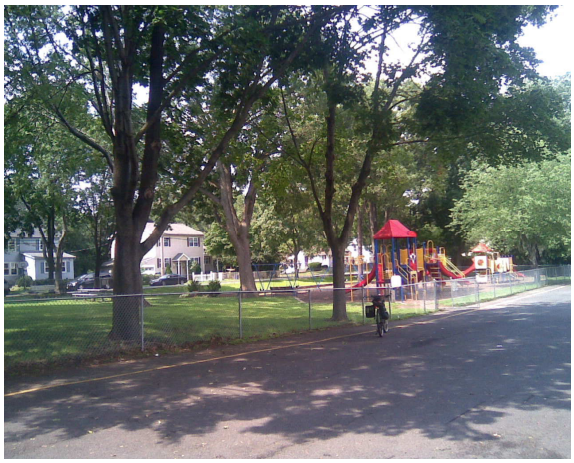
Eisenhower Drive Park (Carlson Park)

Waverly Place Park is a passive park that extends from the southeast corner of the Bryan School field. Both Prospect Avenue and Waverly Place dead end into Waverly Place Park. The area measures 0.574 acres and is comprised of trees and shrubs. There is one pathway from Waverly Place leading to the Bryan School field.

Waverly Place Park

Third Street Park measures 15.078 acres and is the largest open space area in Cresskill. It also serves as the Borough's primary active recreation area. It is bounded on the north by Madison Avenue, on the east by the Tenakill Brook, and on the south by the Tenafly border. On the west, the northern third of the park is bounded by 3rd Street; the middle third widens to about 100 feet west of 4th Street; and the southern third extends to 5th Street. From north to south, the multitude of facilities in this park include a soccer field, basketball court, tennis courts, Cresskill Recreation Center, Pee Wee football field, baseball Diamond, public parking lot, the Cresskill Swim Club, and then to the west the Carolyn Schultz playground equipped with slides, swings, and a jungle gym for young children. There is a walking path that starts at the Cresskill Recreation Center and follows along the Tenakill brook to the Tennis courts. A foot bridge is planned for across the Tenakill Brook to connect with the Daibes Park multifamily, Sunrise and age restricted housing complex to connect with the walking path.





Third Street Park

Tallman House was built during the 1860's. It stands on a 0.564 acre lot at 5 Cresskill Avenue. It was acquired by the Borough of Cresskill through the Green Acres Program. The house and property are used for historic restoration, active and passive recreation, and education including environmental education since a finger of the property extends westward to the Tenakill Brook.

Tallman House

Merrifield Homestead was the home of Dr. Bruce Merrifield who was the 1984 Nobel Prize winner in Chemistry. It is located on the west side of Merrifield Way on 1.31 acres. The house will undergo historic restoration and is planned to serve as a repository for Cresskill's artifacts, and the grounds will be used for passive recreation to include naturalized gardens.

The High School Fields lie behind the Cresskill High School (CHS) between the railroad tracks and the Tenakill Brook. These fields measure 27.7 acres in size. Behind the CHS building are tennis courts and an experimental wetland, followed by the baseball, soccer, football and softball fields, and a running track. The Demarest Brook separates the fields. A road that extends from the high school parking lot runs along the east side of the high school building. A bridge large enough for an ambulance crosses over the stream to the football field. North of the football and softball fields there are woodlands extending to the Demarest municipal border. A foot bridge connects the High School fields to Mezzine Drive.

The High School Fields

The Bryan School Field is located on the east side of Brookside Avenue opposite the school. It is bounded on the east side by the Tenakill Brook. This field measures 6.8 acres in size, and includes a basketball court, a playground equipped with slides, swings, and a jungle gym for young children, and a baseball diamond.

The Bryan School Field

Lambs Lane Open Space measures approximately 0.55 acres, is triangular shaped, and is a natural, unimproved and wooded area. Essentially it is an open space with a stream, steep topography and woodlands. The stream is the southern tributary of the Cresskill Brook. It is located at the intersection of Lambs Lane, Hillside Avenue and Engle Street. This is a passive space that provides respite from our suburban environment. There is evidence of white-tailed deer, hawks, crows, and squirrels. The brook has an occasional heron, crayfish,

trout, and snakes. There is a small perennial garden that is maintained by donation from a local resident. The tree species include American Beech, Black Birch, Sweetgum, Red Oaks, and Maples. Invasives and intrusives include Poison Ivy, English Ivy, Burning Bush, Pachysandra, and Creeping Rose. There are no trails. A small bridge connects Lambs Lane to Engle Street. There is evidence of dumping of landscaping refuse and general littering.

Lambs Lane Open Space

Senior Citizens Center Open Space measures approximately 2.6 acres. It is located at Spring and Washington Streets and East Madison Avenue. It has level topography, a stream, flood plain, woodlands, and wetlands. Its deciduous trees include a wide variety of commonly found trees such as Maples and Oaks. This downtown parcel is also a passive space that provides respite from our suburban environment. There is evidence of white-tailed deer. There are no groomed trails, some litter and numerous fallen trees.

Senior Citizens Center Open Space

Camp Merritt Circle and Monument sits in a circular lawn about 50 feet in diameter, or about 0.59 acres within the inside curb line. Of that area, 0.10 acres is within a lot owned by Cresskill and includes the Monument, and the remainder is within the roadway rights-of-way of Knickerbocker Road and Madison Avenue. The roadway circle serves as its perimeter. Three quarters of the entire circle is within Cresskill Borough and the northwest quarter is within Dumont Borough. The Merritt Monument commemorates Camp Merritt and the veterans of the First World War. It is 65 feet high and stands on the south side of the circle.

Camp Merritt Circle and Monument

14. ENVIRONMENTALLY SENSITIVE AREAS

A. Importance

Each category of natural resource has a threshold beyond which it is considered to: (a) be particularly sensitive to disturbance (sometimes referred to as "environmentally sensitive"); and (b) exhibit particularly valuable ecological benefits. It is professionally accepted that the lands which meet the criteria of being environmentally sensitive include wetlands, the 100 year flood plain, hydric soils, slopes which exceed 15 percent, reservoirs and their tributaries, surface waters, and the habitats for threatened and endangered species (see Figure #7). Most of the lands surrounding drinking water reservoirs and their tributaries are considered to be environmentally sensitive. The sensitivity diminishes the more distant the land is from the reservoir or tributary. Because of this sensitivity, the State of New Jersey

has promulgated regulations that govern land use around reservoirs and their tributaries. While there are no such areas in Cresskill, this issue is of concern to Cresskill residents since all surface runoff within the Borough eventually makes its way into the Oradell Reservoir of United Water Resources via C-1 anti-degradation classified brooks, and Cresskill's potable water comes from these same downstream from Cresskill reservoirs.

Many of the most severe of these categories have been recognized by means of their protection via State or Federal regulation, e.g. wetlands and flood plains. Others are monitored closely by the County, e.g. soils. Some municipalities have elected to protect other resources by municipal ordinances. One example includes the adoption of an environmental checklist to accompany development applications, for the purpose of obtaining full disclosure of expected environmental impacts. Environmental Impact Statement ordinances have also been adopted by some municipalities (not including Cresskill) to fully and impartially explore a development proposal's projected impacts, as well as to study reasonable alternatives. Other ordinances which have been enacted by municipalities include those for the protection of steep slopes and vegetation (trees in particular), and for the control of pesticide and herbicide use.

B. Metholology

The graphic that illustrates Environmentally Sensitive Areas (see Figure #7) was prepared by combining the most serious of these features overlaid onto one map. Those features and thresholds are the ones described in the above paragraphs. The value of this graphic is that it should serve as the first point of reference in the review of development and other land disturbance proposals. If the site of the proposal is included on this graphic, it should be considered "red flagged" and the reviewers should then look more closely at the individual ERI graphics to determine in which category or categories the concern may lay, i.e. where there is reason to believe sensitive natural resources may be present. This should then spur the Applicant to provide site specific information with references targeted to those concerns.

C. Cresskill

The criteria for inclusion on this map exhibit are those cited above. As might be expected, those locations within Cresskill that meet these criteria are concentrated along the Tenakill Brook – Piermont Road corridor and the steeply sloping lands on both the east and west sides of the Borough.

Beyond this mapping, in 1992 New Jersey adopted a Statewide Master Plan to guide land use entitled Communities of Place: The New Jersey State Development and Redevelopment Plan (otherwise known as the "State Plan" or "SDRP"). It was later revised in 1997. On a state-wide basis, and with the assistance of participating municipalities on a voluntary basis, among other categories of varying acceptable levels of development areas this document identifies environmentally sensitive areas that are critically important for all New Jersey citizens that should be preserved. The Borough of Cresskill falls within SDRP's Planning Area 1 (PA 1), otherwise known as the "Metropolitan Planning Area". One of the important policy objectives of this Planning Area is:

> *"Natural Resource Conservation: Reclaim environmentally damaged sites and mitigate future negative impacts, particularly to waterfronts, scenic vistas, any remaining wildlife habitats and to Critical Environmental Sites (sites that would be included within Planning Area 5[15] if they met the minimum size threshold) generally. Give special emphasis to addressing air quality concerns; provide open space and recreational amenities."*

Also, although they were proposed by the Borough to the N.J. State Planning Commission via the Cross Acceptance Process through the Bergen County Department of Planning and Economic Development, no places within Cresskill have been officially designated as "Critical Environmental Sites" (CES) by the State Plan. This is primarily because the process came to a halt before these petitions could be heard. It had nothing to do with the merit of the requests. SDRP defines CES's as being equal in environmental value to lands of Planning Area 5, of which as mentioned there are none within Cresskill. The only difference is that CES's are smaller in size than the minimum size threshold (one square mile) established for a Planning Area designation. Nevertheless, the State Planning Commission has provided the same level of protection for CES's as is afforded to Planning Area 5. Among the policy objectives for PA 5 (and by extension CES's) is:

> *"Natural Resource Conservation: Protect and preserve large, contiguous tracts and corridors of recreation, forest or other open-space land that protect sensitive natural and cultural resources, including endangered species and, particularly, ground and surface water resources that are aquifers and serve as the head waters of many of the State's rivers and streams."*

Since there are no areas within the Borough that meet the criteria for a PA 5 designation, should the State Planning Process rise from its dormancy the Borough may wish to consider resurrecting its petition for CES designation for the sites that are particularly sensitive and replete with natural resources.

[15] Planning Area #5 is New Jersey's Environmentally Sensitive Planning Area for which no new development is encouraged.

15. RECOMMENDATIONS

It is important to understand that this chapter in no way is intended to undermine the impartiality of the remainder of this ERI. As an inventory and not an action plan, it neither supports nor opposes land use alterations or disturbances. Rather, this chapter is intended to advise the Borough of steps that can be taken to become better stewards of those natural resources that remain within the Borough.

A. GEOLOGY AND GROUNDWATER. We recommend that Cresskill begin formulating performance standards, guidelines, best management practices and regulations that would govern discharges, sewage disposal, pet management, property maintenance, and pesticide, herbicide and fertilizer applications. These actions would help to protect the groundwater as well as surface waters. CEC could begin the process by disseminating information to the public about the importance of this resource and the need to protect it. It should be emphasized that one accidental spill or noxious effluent producer is not usually the primary culprit. Rather, quite often the worst source of groundwater contamination comes from non-point source pollution which is the cumulative impact of lawn chemicals and road salts and other noxious materials over large areas.

   Cresskill should also implement and regularly update its Stormwater Management Plan which was prepared in response to the 2004 New Jersey Storm Water regulations. One of the primary benefits would be to diminish the flooding issues that periodically occur along the Piermont Road/Tenakill Brook corridor. Another benefit would be to replenish the groundwater supply.

B. SOILS. The Borough should be hesitant to permit any of the remaining non-urban land areas to be converted to urban land. While it is understood that other higher level authority agencies have policies and jurisdictions which may force such conversions, this recommendation is that any lands over which Cresskill maintains ultimate land use control be prohibited from such conversion.

C. FLOOD PLAINS. Wherever stream encroachment, storm water (including C1 waters buffers) regulations and/or other statewide permits do not mandate land preservation themselves, we recommend that flood plains be preserved through funding from programs such as New Jersey's Green Acres and Blue Acres programs. Additionally, Bergen County has an open space trust fund that may assist in the preservation of flood plain lands. The Federal Emergency Management Agency (FEMA) also has a Blue Acres program for the acquisition of flood prone lands. It is further recommended that the public be educated as to the importance of flood plains, in order to encourage them to avoid deposition of materials within flood plains which: (a) are likely to be carried downstream during a future flood event, potentially degrading downstream water quality, or (b) may constrict the free flow of storm water potentially causing upstream flooding. Residents should also be made aware that the despoilment of flood plains, which includes increasing impervious area,

reduces flood storage capacity potentially causing damage to structures and costing taxpayers money for elaborately engineered storm water control facilities.

D. WETLANDS. Some of the wetlands within Cresskill are protected from development within park lands. The New Jersey Freshwater Wetlands Act of 1988 is expected to protect those other remaining wetlands from disturbance and development. The only exceptions would be those degraded or isolated wetlands that may qualify for Statewide general permits. In addition to providing protection for wetlands and their transition areas within the State, the Act cited above prohibits municipalities from enacting their own local ordinances. In view of these restrictions, the Borough should be diligent about requiring development applicants to obtain a "Letter of Interpretation" from NJDEP. This is a State-generated opinion on the presence, extent and sensitivity of wetlands on or near a particular site.

Wetlands require protection from more than just developers. Wetlands are fragile ecosystems, and they should be protected from intrusion by vehicles, from active recreation, and from the deposition of foreign materials. Often times, this latter item comes in the form of lawn clippings by residents who dismiss this activity as the disposal of organic materials within woodlands, rendering it acceptable in their minds. This is clearly not the case. Most of the ornamental grasses of manicured lawns are not indigenous plants. In contrast to other decaying organic matter which falls naturally within a wetland setting, the clippings of ornamental grasses offer neither wildlife habitat nor food source. Grass clippings have often been treated with pesticides, herbicides, and high nitrogen-content fertilizers. When the clippings degrade, they create an unnatural organic mat that leaches high concentrations of organic matter, as well as the chemical constituents which were applied when it was a lawn. This contributes to oxygen deficiency in, and potentially the eutrophication of surface waters. Grass clippings can also create an impermeable layer which inhibits groundwater recharge, and which smothers native plants. Therefore, Cresskill should educate its residents about stewardship at the local level with a "Think Globally, Act Locally" campaign.

The Borough's Environmental Commission should examine some of Cresskill's wetlands to determine if they should be renominated for designation as "Critical Environmental Sites" by the State Development and Redevelopment Plan, should that plan become active again. Such designations could have value in protecting valuable natural resources that aren't otherwise well protected. In the past, these nominations would be initiated by the Environmental Commission and endorsed by the governing body during an SDRP review cycle.

E. SURFACE WATERS. Point source pollution is a problem that can often be controlled by directing remedial actions at the sources of pollution. The Borough should consider initiating a program whereby it ensures that the

owners of all pipe discharges are in possession of a proper New Jersey State Pollution Discharge Elimination Permit (NJSPDES).

In contrast to point source, non-point source pollution is extremely difficult to control since its source cannot be isolated. The best method of non-point source pollution control is to educate those who could prevent its generation in the first place. Significant beneficial reductions in non-point source pollution could be achieved if road crews would reduce the amount of salt used for winter roadway de-icing, and if they would use a less objectionable product than calcium chloride. Facilities such as golf courses could be required to practice Best Management Practices (BMP) by using only organic fertilizers, and in limited quantities, and to limit the use of herbicides and pesticides. Residents could be convinced through education to follow the same BMP's for their properties as well. This would be particularly beneficial for those properties that are situated adjacent to open spaces and surface waters. Beyond this, developers could be required to follow BMP's for soil erosion and sedimentation control, including the installation of oil traps and catchments within terminal catch basins, by the use of biofilter drainage basins, and by strictly utilizing the methods included in the 2004 N.J. Stormwater Regulations (i.e. rain gardens).

In addition to these measures, the natural pretreatment of storm water discharge through the construction of silt fences, sedimentation basins, infiltration basins, vegetated buffers, meandering grassy swales, and wetlands regimes are also beneficial. The Borough should be mindful of insisting on adherence to NJDEP's regulations regarding C1 waters and their buffers. In addition, integrated Pest Management procedures could also be followed which limit the use of pesticides, thereby minimizing non-point source pollution.

Since it is likely that much of Cresskill's storm runoff is collected and conveyed directly into open water bodies without pretreatment, the Borough could require applicants to comply with its Storm Water Control Master Plan so that pollutants aren't carried directly into the state's open waters without pretreatment. The Borough could also initiate a program to retrofit its own public drainage outlet structures to comply with the State's 2004 regulations.

F. VEGETATION AND WILDLIFE. These two items go hand in hand because they depend upon each other for their survival and sustenance. For example, it would be difficult for wildlife to find food, shelter, safe cover, and suitable breeding and nesting grounds without healthy stands of vegetation. Likewise, much of our vegetation depends on wildlife to spread their seeds for propagation purposes. Theirs are symbiotic relationships which result in large benefits to the overall environment.

In addition to the indisputable value of vegetation and wildlife of undeveloped open spaces, one of the most valuable and beautiful aspects of Cresskill is the presence of vegetation and habitat which is interspersed within the Borough's

developed areas, albeit it limited in its extent. While much of this vegetation is ornamental, large quantities are indigenous, native or naturalized species which inhabit the property lines between yards and properties. This mature vegetation is one of the most important factors that differentiate Cresskill from other highly developed suburban towns. Native trees in general, and in particular along Cresskill's streets, have the potential to represent a recognizable Cresskill vernacular. For this reason among others, the vegetation of the Borough should be protected. This can be done by means of strengthened tree removal and land clearing ordinances.

G. OPEN SPACE. Through the use of four separate installments of Planning Incentive grant funds from NJDEP Green Acres, the Borough has acquired privately owned open space and potential open space lands for conservation and recreation purposes, and the Borough is seeking to acquire more. A part of the emphasis is towards lands that are contiguous to larger blocks of open space and not otherwise protected, e.g. the property at Margie Avenue and Piermont Road which is adjacent to the Margie Avenue Playfields. The New Jersey Green Acres program has become a boon to this municipal program. The Borough has also obtained funding assistance from the Bergen County Open Space Trust Fund. In mostly developed suburbs, opportunities to preserve and expand open spaces are rare and may never again present themselves.

In response to this desire and need, the Cresskill governing body authorized Hakim Associates to prepare and update an Open Space and Recreation Plan (OSRP) in 2004 and 2009 to address the issues of open space preservation and acquisition (and creation in the cases where former land uses are demolished in favor of open space and recreation) in Cresskill. Despite the reverse sequence of their preparation, that document should be viewed as both a companion to and a partial implementation of this ERI. It explores a variety of planning techniques for these objectives, some conventional and some innovative, which are available for consideration. The original 2004 OSRP formed the basis for Cresskill being awarded the Planning Incentive grant cited above.

Examples of less expensive non-fee simple acquisitions are numerous. The Borough of Cresskill could consider the purchase of Conservation and/or Recreation Easements over certain properties. A Conservation Easement would allow the current property owners to continue to own their properties and use them for a variety of purposes, but would preclude their development. A recreation easement would permit public access onto the properties for passive recreational activities, and would conserve the natural resources of the properties. Other techniques could include land donations, land trades, leases, current use assessments, municipal regulatory techniques, cluster zoning, and transfer of development rights. And on its simplest level, oftentimes more responsible and/or sensitive property management techniques can create the appearance of more open space (see Environmentally Sensitive Areas below).

From a land use planning perspective, the Borough could consider zoning open space and park lands within Cresskill as such, as opposed to their current zoning classifications which simply conform to their adjacent building zones. Such an action would have a more permanent memorializing effect on the actions being taken by the current administration and environmental commission.

H. BROWNFIELDS (CONTAMINATED SITES). Since brownfields are not a significant issue in Cresskill, they were not a topic undertaken in this initial ERI. Nevertheless, NJDEP maintains an inventory of such sites, and it would behoove the Borough to monitor the existing brownfields within its borders and take steps to promote their remediation. This can include taking such steps as (a) encouraging property owners to seek higher authority assistance in their cleanup; (b) relieving development regulations for the redevelopment of and related fees for brownfield sites; and (c) becoming flexible in the land uses permitted for these sites so that they do not remain fallow. The Borough should monitor its current industries that are not brownfields to ensure that they do not become one. Also, the Borough can be cautious about permitting new industry into the community that has a history of generating brownfield conditions.

I. ENVIRONMENTALLY SENSITIVE AREAS. The nomination of Critical Environmental Sites (CES's) for the SDRP was scheduled to occur on a three-year interval, although that has not been the State Planning Commission's history. They have regularly been behind in that schedule, and the entire process has become dormant. Nominations could only be made by the governing body of the municipality within which the resource is situated. We recommend that Cresskill only consider renominating environmentally sensitive sites for CES designation if they might be threatened by planned development. Unless there is a change at the State level which is underway to some early degree, this process can be initiated by contacting the Bergen County Department of Planning and Economic Development who serves as the intermediary between the State and its towns.

Municipal regulatory techniques can also be effective. For example, some communities enact environmental assessment and/or environmental impact statement ordinances that require the full public disclosure of existing conditions and impacts which could reasonably be expected to result from a development or disturbance proposal. These ordinances could also require the exploration of reasonable alternatives and the provision of acceptable mitigation of impacts, and would be subject to the scrutiny of an intense public review process. As a compromise ordinance, those lands that appear on the Environmentally Sensitive Areas exhibit, and that are presented to the Borough as subjects of development or subdivision proposals, could receive further protection by the adoption of a local ordinance with the following requirements. The applicants for such a proposal could be required to prepare site-specific studies, more closely evaluating the location and extent of sensitivity for each natural resource which may be present on or adjacent to the subject site. Each applicant could

then be required to project the impacts upon those resources which might reasonably be expected to result from their proposal, study and present alternatives to their proposals, and submit a plan for minimizing or mitigating against anticipated adverse impacts.

Environmentally sensitive areas can also be protected by a more widespread acceptance of cluster development. The theory behind cluster development is that sensitive lands can be preserved by permitting higher densities on adjacent non-sensitive lands. Unless Cresskill is presented with a large wholesale redevelopment proposal, such as might occur at some point along Broadway, this technique has little applicability in fully developed towns.

* * *

APPENDIX

U.S.G.S. Most Recent Topographic Data

Figure #3 Parks Recreation and Open Space, Cresskill Master Plan, June 2010

Figure #8 Aerial Photograph, Cresskill Master Plan, June 2010

8-15-11 letter and request form from Michael G. Hakim of Hakim Associates to NJDEP Division of Parks and Forestry, Office of Natural Lands Management, Natural Heritage Program Associates regarding rare species in Cresskill Borough, Bergen County, N.J.

8-22-11 letter from NJDEP Division of Parks and Forestry, Office of Natural Lands Management, Natural Heritage Program, to Michael G. Hakim of Hakim Associates regarding rare species in Cresskill Borough, Bergen County, N.J.

Natural Heritage Grid Maps: Description of how grid maps identify species and natural communities with documented occurrences in localized areas.

Natural Heritage Grid Map for Yonkers, NJ - NY, February 2004.