NATURAL RESOURCES

Introduction

The natural resources section of the Master Plan uses the environmental criteria of topography, soils, and water resources to evaluate the town's land area regarding conservation issues and the potential for development. Although natural features can often enhance a particular development site, they just as often pose significant barriers to development; this can be seen by examining locations where existing development has occurred. It is true that transportation routes are another factor in the location of development; however, to a great degree, the natural features of the land also determine the location of roads and the former railroads.

This section enables the Planning Board to address areas of the town that are most suitable for development and high intensity land uses, and evaluate the existing limitations of the land that would have to be accommodated. Environmental limitations may include steep slopes, seasonally wet soils, wetlands, floodplains, shallow bedrock, and aquifers.

This section also identifies the areas of town that deserve special protection due to the environmental function of the land, for example, certain soil types designated for agricultural purposes. In addition, this section notes specific areas the town may wish to conserve for future community use due to their aesthetic or historic qualities. Not all open spaces need to be steep slopes or wetlands. Some areas may be prime lands set aside for future school sites, parks, intensive farming operations, or other limited low intensity land uses that add value to the overall community.

Alstead has many natural features that make the town a very desirable place to live. The Town has maintained a typical New England character with the Town Common in the center, and the development spiraling out from this center. Outside of the village, Alstead is still quite rural, with fields, streams, and woods. As development pressures mount, however, there will be more pressure on the Planning Board to allow smaller lot sizes in other parts of Town. This section will aid the Planning Board and the residents to decide where they want growth to occur while at the same time preserving the natural environment that is critical to a high quality of life.

Topography

Alstead has a land area of approximately 39 square miles or 25,394 acres of which 382 acres is lakes and ponds. The surface of the land is irregular and broken, with an absence of any mountainous peaks and an average elevation of 478 feet. The highest point in Alstead is Smith Hill, at 1795 feet. Two of the most distinguishing features in Alstead are Warren Brook and the Cold River. There are several other minor streams, some of which empty into branches of the Ashuelot River. The two largest waterbodies are Lake Warren, which lies in the eastern part of Town and Caldwell Pond, which lies in the southern portion.

Topography is an important consideration when assessing the development potential of land. Soil conditions are directly related to topography, with slope and drainage features having a determining influence. While slope is only one of many factors influencing the soil type of a particular site, it is the primary component of topography. The following discussion defines slope and addresses the influence slope has on the development potential of land.

Soils

Soils information is an important consideration in land use planning since the various characteristics of soils – such as steepness, wetness, flood susceptibility, etc - have such an impact on land use opportunities. Soil information for Alstead was obtained from the following sources:

1. Soil descriptions and mapping: Soil Survey of Cheshire County, New Hampshire, published by the US Department of Agriculture Soil Conservation Service, 1982.

2. Soil development capability: Soil Potential Ratings for Development; Cheshire County, NH, prepared by the Cheshire County Conservation District in 1984.

The majority of soils in Alstead are of the Bernardston – Cardigan – Kearsarge – Dutchess complex. These are very deep, moderately deep, and shallow, gently sloping to very steep, well drained and somewhat excessively drained, loamy soils that formed in glacial till. These types of soils are mostly wooded. Some areas, particularly gently sloping and strongly sloping areas of Bernardston and Dutchess soils, are used for farming. Slope, stones on the surface, rock outcrops, depth to bedrock, and potential erosion are major limitations to use these soils for most types of farming and development. On Bernardston soils, slow permeability in the hardpan layer is a limitation to use as sites for septic tank absorption fields. Most areas where these soil types occur are suited to woodland use. Gently sloping, nonstony areas of Bernardston and Dutchess soils are suited to cultivated crops. Strongly sloping, nonstony areas of Bernardston and Dutchess soils are suited to hay and pasture. Gently sloping and strongly sloping areas of Dutchess soils are suited to development.

The other three soil types found in Alstead are: Windsor – Agawam – Hoosic; Marlow – Berkshire Tunbridge; and Berkshire – Tunbridge – Lyman. Windsor – Agawam – Hoosic are very deep, nearly level to very steep, excessively drained, well drained, and somewhat excessively drained, sandy and loamy soils that formed in glacial outwash deposits. Much of these soil types are used for crops in support of dairy farming. Nearly level or gently sloping areas of Agawam soils are suited to farming. Gently sloping areas of Hoosic soils are also suited to farming, but droughtiness is also a limitation. Agawam soils and nearly level to strongly sloping areas of Windsor and Hoosic soils are suited to development. If these areas are used as sites for septic tank absorption fields, ground water pollution is a hazard. Erosion is a hazard on all of these soil types. Terrace edges have many deep gullies. Erosion control measures are needed for most farm and non-farm uses.

Marlow – Berkshire – Tunbridge are very deep and moderately deep, gently sloping to very steep, well drained, loamy soils that formed in glacial till. These soil types are mostly wooded, and partly used for development and a few farms. Most areas are suited to woodland use. Slope, stones on the surface, depth to bedrock, erosion, and, in Marlow soils, slow permeability in the hardpan layer are major limitations to use these soil types for farming and development. Strongly sloping, non-stony areas are suited to hay and pasture. Gently sloping, non-stony areas of Marlow and Berkshire soils are suited to cultivated crops. Gently sloping to strongly sloping areas of Berkshire soils are suited to development. On Marlow soils, slow permeability in the hardpan layer is a limitation to use as sites for septic tank absorption fields.

Berkshire – Tunbridge – Lyman are very deep, moderately deep, and shallow, gently sloping to very steep, well drained and somewhat excessively drained, loamy soils that formed in glacial till. These soil types are mostly wooded, and partly used for development. Most areas of these soil types are suited for woodland use. Slope, depth to bedrock, areas of rock outcrop, stones on the surface, and erosion are the major limitations to use these soil types for farming and development. In gently sloping to strong sloping areas Berkshire soils are suited to farming and development.

The soils of Alstead are characteristic of the Monadnock Region with an almost equal division among developable and undevelopable soil types. Approximately 50% of the soils in Town are suitable for development while some 50% have restrictive features such as wetness, steepness of slope, hardpan or floodplain conditions. Soils on steep slopes are usually thin with exposed bedrock or a shallow depth to bedrock. Floodplain soils tend to be fine and sandy with wetland conditions. Floodplain areas often have well-developed topsoil making them desirable for certain agricultural uses.

STEEP SLOPES

Generally speaking, the steeper the land the greater the possibility for erosion and sedimentation, and the more problems can be encountered in siting wells and septic systems.

Steepness is measured in terms of slope, which is defined as the change in elevation (vertical distance) over horizontal distance; the more abrupt the change in elevation, the steeper the slope. Slope is measured and expressed as a percentage that represents the relationship between elevation and horizontal distance.

Typical categories that might be seen on a slope map are 0-8%, 9-15%, 16-24%, and over 25%. Land in the 0-8% slope category is generally preferred for all types of development. Gradual slopes are most favorable for building roads and public water and sewer facilities and can be installed at the least cost to the community. Also, excavations for most structures can be done at a minimal cost and erosion associated with such work can be reduced easily on-site. The exceptions to this would be wetland areas and floodplains because they occur primarily in the 0-5% slope range. An examination should be made as to the environmental function of such wetland and floodplain areas, as well as the risks that might be inherent in development before such lands are utilized for building sites.

As slopes increase to 8-15%, the land is more suited to less intensive forms of development. Carefully placed residential dwellings and some agricultural uses (orchards and field crops) may be suitable for this terrain. As development approaches a 15% gradient, it requires more careful consideration for all types of development. Once a slope exceeds a 15% gradient, all forms of development are considered unsuitable, although it is really at the 25% slope and above that development becomes very problematic. Areas having 25 percent or greater slope have benefits as conservation areas for low intensity recreational uses and wildlife habitats. Also, their disturbance can create serious erosion problems, washing out topsoil and even roadways downhill. Forestry practices on such slopes must be confined to low-impact operations, with proper erosion controls in place. Other important controls for forestry uses include minimal basal area cutting, and skid roads designed for steep slope harvesting.

When developing steep terrain, the potential for environmental damage increases as the slope gradient increases. Overly steep slopes consisting of sands and gravels left after the excavation of an area will quickly gully and erode. Erosion control barriers should be in place at the time of excavation and prompt reseeding and regrading should take place afterwards. Surface water run-off rates and erosion factors increase as the slope increases. This will cause sedimentation of the surface waters down slope and will clog stream channels and rivers if no erosion controls are in place.

Alstead has 21 soil types associated with steep slopes as shown in Table 1 below and *Map 8-1: Steep Slopes*:

Table 1- Steep Slope Soil Types

Symbol	Soil Name	Characteristics	Slope (%)
36E	Adams	Loamy Sand	15-25
57D	Beckett	Fine Sandy Loam	15-25
72D	Berkshire	Fine Sandy Loam	15-25
771D	Berkshire and Mod	Complex	15-35
365E	Berkshire and Monadnock	Complex	25-50
365D	Berkshire and Monadnock	Complex	15-25
331E	Bernardston	Silt Loam	25-50
330D	Bernardston	Silt Loam	15-25
360D	Cardigan-Kearsarge	Complex	15-25
361D	Cardigan-Kearsarge	Rock Outcrop Complex	15-25
22E	Colton	Loamy Fine Sand	15-50
367E	Dutchess	Silt Loam	25-50
366D	Dutchess	Silt Loam	15-25
510E	Hoosic	Gravelly Fine Sandy Loam	15-50
362E	Kearsarge-Cardigan	Rock Outcrop Complex	25-50
161E	Lyman-Tunbridge	Rock Outcrop Complex	25-50
77E	Marlow	Fine Sandy Loam	25-50
76D	Marlow	Fine Sandy Loam	15-25
143D	Monadnock	Fine Sandy Loam	15-25
60D	Tunbridge-Berkshire	Complex	15-25
61D	Tunbridge-Lyman	Rock Outcrop Complex	15-25

SOURCE: SOIL SURVEY OF CHESHIRE COUNTY, NEW HAMPSHIRE, 1982

These soils are found on the sides of hills, along ridges and as rocky outcrops void of soils. Ranging in slope from 15% to 50%, these soils are classified by the SCS as having low and/or very low development potential because of steep slope, exposed or shallow bedrock and the lack of adequate corrective measures capable of increasing the development potential of such sites.

WETLAND SOILS

Wetland soils in Alstead are those that the soil survey categorizes as being poorly drained or very poorly drained (including muck and peat). Alstead has a very scattered pattern of wetland soils, accounting for 2,015 acres of the total land area. *Map 8-2: Wetlands and Hydric Soils* shows many small patches and a few rather large sections of wetlands in the Town to the east and northeast of Lake Warren. The soil types and characteristics that make up the wetland soils are described in Table 2:

TABLE 2- WETLAND SOIL TYPES

Symbol	Soil Name	Characteristics	Suited For	Not Suited For
295	Greenwood	Mucky Peat	Habitat for wetland wildlife	Anything but Habitat
109	Limerick	Silt Loam	Open space, natural floodwater storage areas, habitat for wetland wildlife	Cultivating crops, grasses, legumes; urban development
347B	Lyme and Moosilauke	Complex	Habitat for wetland wildlife	Cultivating crops, hay and pasture; urban development
414	Moosilauke	Fine Sandy Loam	Habitat for wetland wildlife	Cultivating crops, hay and pasture; urban development
495	Ossipee	Mucky Peat	Habitat for wetland wildlife	Anything but Habitat
647B	Pillsbury	Fine Sandy Loam	Habitat for wetland wildlife	Cultivating crops, hay and pasture; urban development
533	Raynham	Silt Loam	Habitat for wetland wildlife	Cultivating crops, hay and pasture; urban development
5	Rippowam	Fine Sandy Loam	Habitat for wetland wildlife	Cultivating crops, hay, pasture, urban development
6	Saco	Mucky Silt Loam	Habitat for wetland wildlife	Anything but Habitat
340B	Stissing	Silt Loam	Habitat for wetland wildlife	Cultivating crops, hay and pasture; urban development

SOURCE: SOIL SURVEY OF CHESHIRE COUNTY, NEW HAMPSHIRE, 1982

AGRICULTURAL SOILS

The Cheshire County Soil Survey also designates prime farmland soils. This designation is based in the soils' inherent fertility for agricultural production and physical characteristics which allow it to withstand various management practices without loss of productivity or need for additional or extraordinary care. Of the 22 soil types in Cheshire County that are considered to be prime farmland, 15 of them are found in Alstead. Furthermore, they may exist in formations that are too small or inaccessible for crop farms. The LESA (Agricultural Lands Evaluation and Site Assessment) manual should be consulted when a choice needs to be made regarding the use of one particular farmland over another, depending on whether the use is for farming or general development.

CONSTRUCTION MATERIALS

The primary source for identifying construction material resources is the Soil Survey of Cheshire County, which was completed in 1984[13]. The document includes a table entitled "Construction Materials",” that lists four types of material by soil category; these are: roadfill, sand, gravel, and topsoil. *Maps 8-3, 8-4 and 8-5* show where construction materials are most likely to be found in Alstead.

[13] Soil Survey of Cheshire County, New Hampshire, US Department of Agriculture, Soil Conservation Service, 1984. (The SCS is now the Natural Resource Conservation Service.)

FLOODPLAINS

Floodplains are land areas that are susceptible to flooding. These areas actually have two parts: the floodway and floodway fringe. The floodway includes the channel and an additional area that often carries excess flow. The floodway fringe (more commonly known as the 100-year floodplain or the Special Flood Hazard Area) is a broader area over which floodwater may spread, but where the flow velocity is slower. This is an important distinction for land use planning, since some uses can safely occur in the Special Flood Hazard Area, but not in the floodway.

The Federal Emergency Management Agency (FEMA) has mapped the floodplains for all relevant municipalities; the boundaries of the floodplains were computed at cross sections interpolated between cross sections, based on hydraulic information and past experience of flooding. Flood Insurance Rate Maps define the 100-year floodplain (meaning there is a 1 out of 100 chance of flooding in any given year; over long periods of time, base floods will occur on the average once every 100 years), and an area of 500-year floodplain (a 1 out of 500 chance of flooding in any given year).

The Flood Insurance Rate Maps for Alstead became effective May 23, 2006, and the town then entered into the National Flood Insurance Program, which permits homeowners who live in the floodplain to purchase insurance for their property. However, in order for landowners to be able to purchase this insurance, the town needed to adopt a Floodplain Management Ordinance, which it has done. This Ordinance requires the town to keep track of all development in the Special Flood Hazard Areas (SFHA) and ensure that if any new construction or substantial improvements to a home are proposed for the SFHA, the lowest enclosed floor must be at or above the base flood elevation.

The purposes of this requirement are to minimize the potential for flood damage, to avoid damage-prone uses in the floodplains, and to reduce development pressure of flood hazard areas. Communities that do not maintain and/or enforce their floodplain regulations may be suspended from the insurance program, which could have serious consequences for any affected landowners if their mortgage holders wished to cancel the mortgage. For these reasons, it is very important for the town to keep the floodplain management ordinance up to date by amending it as necessary, and to monitor all development within these areas.

WATER RESOURCES

Our water resources (perennial streams, ponds, lakes, wetlands, floodplains, and stratified drift aquifers), are some of our most sensitive natural resources - susceptible to loss due to small size, fragile conditions, poor prospects for regeneration once disturbed, vulnerability to pollution, and areas with a high potential for special communities or species. We are familiar with the legacy of degraded water quality and aquatic habitats, the loss of riparian habitat, the diversion of rain water and snow melt from natural courses of meandering through low lands or recharging ground water. Just as the ubiquity of trees along country roads throughout our Region may belie the degradation of natural forested communities by the road and traffic, home building and recurrent timber harvest, so the abundance of water may perpetuate a false sense of security about the well-being of the aquatic in our landscape mosaic.

Discussing water resources in terms of these discrete features – ponds and lakes, streams, aquifers – should not obscure the fact that these are not static, isolated resources, but parts of our hydrologic system – the ceaseless cycling of water through the atmosphere, soil and geologic formations, myriad organisms, and overland as surface water – and through our homes, businesses and industries.

Alstead has a land area of 39 sq miles or 25,012 acres. Approximately 1.5%, or 382 acres, of this total area consists of lakes and ponds. Alstead's largest waterbody is Lake Warren (approximately 200 acres). Alstead has a number of other small ponds scattered around the town. While there are numerous streams flowing through the town, the most notable flowing waterbodies are the Cold River and Warren Brook. Aquifers, or groundwater, are also included in this analysis, since they provide an important source of water for private and community wells. A description of the town's watersheds, waterbodies, watercourses, and aquifers is presented below.

WATERSHEDS

A **watershed** is a land area from which all the surface run-off drains at a single point. Watersheds can be any size, from a parking lot to half a continent. Watersheds are meaningful units for conservation planning because of the pervasive nature of water – it continuously moves through the natural and manmade environments and our water quality is the net product of everything it encounters - air, soil, pavement, forests – and in the event that a water quality problem is identified, the cause is probably within the same watershed.

Watersheds for this project were delineated to identify all land area from which water flows into and through Alstead. Hence, the total land area of the watersheds considered here is greater than the total land area of the Alstead corporate limits (See *Map 8-6: Watersheds*).

The Town of Alstead falls both within the Cold River and Ashuelot River watersheds. The Town has been further subdivided into 22 sub-watersheds, some nested within others, to identify the land area from which water flowing in major streams and water bodies originates as rainfall, snow melt, or groundwater outbreak.

WATERBODIES

Alstead has many waterbodies scattered throughout Town. Most of them are quite small, only measuring a few acres or less in size. The largest is Lake Warren (200 acres) in the eastern part of Alstead. Caldwell, Newell (Arch), and Cranberry are the other larger ponds in Town. Vilas Pool, located in the northwest part of town, is a recreational area, formed by a dam which slows the flowing Cold River. Most of Alstead's water bodies are too isolated to support much recreation use, with the exception of Lake Warren and Vilas Pool.

RIVERS AND STREAMS

Alstead has approximately 11 perennial rivers and streams flowing through town, the most significant one being the Cold River, which runs through the northwest part of Town. The other significant watercourse in Alstead is Warren Brook, which runs from Lake Warren to the Cold River. These rivers and streams are delineated on *Map 8-6: Watersheds*.

AQUIFERS

Aquifers are geologic formations (either fractured bedrock or sand and gravel) that by virtue of their physical structure and location on the landscape can provide water through drilled wells in sufficient quantities to support human uses. Characteristics of high-value aquifers include being situated down stream in a watershed, being in a watershed with a preponderance of natural forested land cover, and having a physical structure that is highly permeable – open spaces between particles of sand and gravel or open fissures and interconnected networks of cracks in bedrock - to both store and transmit water. Aquifers are re-supplied primarily by water falling as precipitation. Rain and snow melt move downward through soil, sand and gravel and/or cracks in bedrock to a saturated zone where the spaces between particles and cracks in rock are filled with water. It is very important that the surface of the earth be able to transmit water so that a certain percentage can be stored underground. Excessive compaction or extensive covering of the land surface reduces the volume of groundwater which affects the supply of water to wells.

Aquifers of medium to high potential occur in southwestern New Hampshire as unconsolidated deposits of sand and gravel, or in bedrock fractures. The unconsolidated deposits in this region are principally stratified drift deposits (sand and gravel sorted and deposited by running water from the melting glaciers) that are usually in valley floors or on adjacent hill slopes. These materials have abundant pore space to store water, and pore space may amount to more than 30 percent of the total volume of the deposit. Consequently, stratified deposits at the bottom of watersheds are good aquifers.

Fractured bedrock can be highly-productive aquifers, especially when overlaid by a layer of sand gravel, which allows the recharge to occur directly from above. Most domestic water wells in Alstead are drilled into bedrock – and while many have low yields, bedrock fractures can be staggeringly water rich – and sometimes transmit great volumes of water over many miles.

In contrast, a till aquifer will typically have a lower-yielding well life due to its mixture of clay, silt, gravel and boulders that tend to compact. The transmission and storage of water is greatly decreased in this type of aquifer. The water table (the top of the saturated zone) can fluctuate, depending on the volume recharge to aquifer material.

Groundwater in saturated soils is generally vulnerable to pollution because surface contamination can infiltrate directly into it. It is possible, however, to trace the source of pollution by finding the watershed boundary. Once a pollutant enters an aquifer, it may remain in place for an indeterminate period of time. While pollutants can enter an aquifer easily because sand and gravel are porous and transmit water rapidly, once in the aquifer their movement is then governed by groundwater flow, which moves very slowly through the tiny pore spaces of the glacial till.

Sources of aquifer pollution are frequently located on the ground surface directly above or contiguous to the aquifer: septic tank effluent, landfill refuse, leakage from sewer lines or ruptured fuel tanks, agricultural fertilizers and pesticides are among the many possible sources of pollution for an aquifer. In addition to these potential contaminants are the materials such as fuels, lubricants or other toxic materials associated with earth excavation, an activity that is, of course, directly associated with sand and gravel aquifers.

The US Geological Survey provides aquifer delineation maps for the entire state. The map is essentially a surficial geology map, showing the distribution of unconsolidated (not bedrock) geologic material on the land surface. Bedrock aquifers do exist, but these were not part of this particular study. This study identifies areas of sand and gravel and measures the rate of transmissivity - that is, the speed with which water passes through the materials, in increments of 1,000 feet squared per day.

Map 8-7: Stratified Drift Aquifers shows the locations of soils that are commonly associated with concentrations of groundwater (aquifers), along with the location of private (since 1984) and public water supplies. The map also shows the existing wellhead protection areas surrounding the public water supplies. As may be seen from the examination of this map, the highest potential for the location of an aquifer is along Cold River and Derby Brook in northwest Alstead. This area includes the location of two public wells. A second area of interest is south of Lake Warren and east of Raymond Pond. There are current three public wells located in this area. In the northeast corner of Alstead, there is a small area along Great Brook which has the potential for groundwater yield. There are no public water supplies at this location.

NATURAL RESOURCES ANALYSIS

The following tables and figures quantify the distribution of Alstead's natural resources by watershed. In addition to the natural resources, the location of buildings, roads, fields, gravel pits, etc, are also accounted for in the watershed analysis. The natural resources data available for use in the Planning Commission's GIS data is described without regard for development, e.g. a USDA Soil Survey may indicate an area of land as prime farmland soil, while in reality, that land also has several homes and roads. The analysis attempts to quantify the displacement of natural resource by development – the numbers that correspond with the variable name qualified with "net" – meaning the area free of buildings, yards and pavement. The analysis is summarized for 1) the entire study area, 2) the watershed of the Ashuelot River, and 3) the Cold River Watershed. The Ashuelot River Watershed is further broken down into the sub watersheds of Dart Brook and Thompson Brook with the remaining sub watersheds listed just by numbers (1, 2, 4, 6 and 12). The Warren Brook sub watershed is similarly indicated as part of the greater Cold River Watershed with the remaining sub watersheds listed by number. *Map 8:6- Watersheds* shows each sub watershed with the corresponding number

The tables are separated into four categories: water resources, sensitive resource areas, soil resources and development parameters. Following the tables are graphs that reflect the total percentages of a number of land cover types.

Table 1.1- Summary

	Study Area Total	Ashuelot River Total	Cold River Total
Water Resources:			
TOTAL AREA IN WATERSHED (acres)	**27,551**	10,285	17,266
NET AREA (acres)	**25,951**	9,907	16,044
TOTAL LAND AREA IN WATERSHED (acres)	**27,136**	10,144	16,992
NET AREA (acres)	**25,536**	9,766	15,769
WATERSHED AREA IN TOWN	**25,197**	10,239	14,958
WATERSHED LAND AREA IN TOWN	**24,781**	10,099	14,683
NET AREA (acres)	**24,253**	9,722	14,531
LAKES&PONDS (Count)	**58**	28	30
WATERBODIES AREA (acres)	**416**	141	275
WATERBODY SHORELINE (miles)	**27**	10	17
NET SHORELINE (miles)	**24**	9	15
STREAMS (miles)	**48**	16	31
STREAMS DENSITY (CU.FT)	**0**	0	0
USGS WETLAND (acres)	**276**	116	160
USGS WETLAND100ft BUFFER (acres)	**989**	336	653
NWI WETALND (acres)	**702**	346	355
USDA HYDRIC SOIL (acres)	**2,303**	891	1,412
STRATIED DRIFT AQUIFERS (acres)	**937**	54	883

Table 1.2- Ashuelot River Watershed Water Resources

	Study Area Total	Ashuelot River Totals	Ashuelot River Watershed											
								Dart Brook Subwatershed		*Dart Brook Total*	Thompson Brook Subwatershed			*Thompson Brook Total*
			1	2	4	6	12	3	13		11	14	15	
Water Resources:														
TOTAL AREA IN WATERSHED (Acres)	27,551	10,285	1,615	90	634	308	305	3,321	240	*3,561*	2,628	145	999	*3,772*
NET AREA (acres)	*25,951*	9,907	*1,565*	*90*	*630*	*299*	*305*	*3,222*	*240*	3,462	*2,535*	*126*	*896*	3,558
TOTAL LAND AREA IN WS (AC)	27,136	10,144	1,609	90	596	308	305	3,231	240	*3,471*	2,623	145	998	*3,766*
NET AREA (acres)	25,536	9,766	*1,558*	*90*	*592*	*299*	*305*	*3,132*	*240*	3,372	2,530	*126*	*895*	3,552
WATERSHED AREA IN TOWN	25,197	10,239	1,614	90	634	308	305	3,286	233	*3,519*	2,628	145	998	*3,770*
WATERSHED LAND AREA IN TOWN	24,781	10,099	1,608	90	596	308	305	3,196	233	*3,429*	2,623	145	997	*3,764*
NET AREA (acres)	24,253	9,722	*1,557*	*90*	*592*	*299*	*305*	*3,097*	*232*	3,330	2,530	*126*	*893*	3,550
LAKES&PONDS (Count)	58	28	4	0	3	0	0	13	0	*13*	4	0	4	*8*
WATERBODIES AREA (acres)	416	141	6	0	39	0	0	90	0	*90*	5	0	1	*6*
WATERBODY SHORELINE (miles)	27	10	1	0	2	0	0	6	0	*6*	1	0	0	*1*
NET SHORELINE (miles)	24	9	0	0	2	0	0	6	0	*6*	0	0	0	*1*
STREAMS (miles)	48	16	2	0	0	0	0	5	0	*6*	7	0	1	*8*
STREAMS DENSITY (CU.FT) stream in FT/ watershed area insq FT	0	0	0	0	0	0	0	0	0	*0*	0	0	0	*0*
USGS WETLAND (acres)	276	116	27	0	4	9	7	23	17	*40*	16	0	14	*29*
USGS WETLAND100ft BUFFER (acres)	989	336	62	0	13	38	24	73	44	*118*	42	0	40	*82*
NWI WETALND (acres)	702	346	55	0	32	16	6	145	18	*163*	52	0	22	*74*
USDA HYDRIC SOIL (acres)	2,303	891	182	7	52	87	16	297	26	*323*	146	10	68	*224*
STRATIED DRIFT AQUIFERS-acres	937	54	0	0	0	0	0	54	0	*54*	0	0	0	*0*

Table 1.3- Cold River Watershed
Water Resources

			Cold River Watershed												
	Study Area Total	**Cold River Total**	**7**	**8**	**9**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	Warren Brook **5**	**10**	Warren Brook Total
Water Resources:															
TOTAL AREA IN WATERSHED (acres)	27,551	17,266	3,138	983	425	3,310	677	66	41	363	163	35	3,348	4,718	**8,066**
NET AREA (acres)	25,951	16,044	*3,020*	*961*	*412*	*3,066*	*586*	*36*	*33*	*310*	*109*	*28*	*3,069*	*4,415*	**7,484**
TOTAL LAND AREA IN WATERSHED (acres)	27,136	16,992	3,124	983	424	3,300	668	63	41	363	158	28	3,141	4,699	**7,840**
NET AREA (acres)	25,536	15,769	*3,006*	*961*	*411*	*3,056*	*577*	*32*	*33*	*309*	*104*	*21*	*2,862*	*4,396*	**7,258**
WATERSHED AREA IN TOWN	25,197	14,958	1,397	983	116	3,240	677	66	41	206	162	34	3,348	4,688	**8,036**
WATERSHED LAND AREA IN TOWN	24,781	14,683	1,384	983	116	3,229	668	63	41	206	157	27	3,141	4,669	**7,810**
NET AREA (acres)	24,253	14,531	*1,301*	*961*	*1,111*	*2,994*	*581*	*33*	*33*	*157*	*105*	*22*	*2,867*	*4,367*	**7,233**
LAKES&PONDS (Count)	58	30	2	1	1	8	2	1	0	1	1	3	5	5	**10**
WATERBODIES AREA (acres)	416	275	14	1	0	10	8	4	0	0	5	7	207	19	**226**
WATERBODY SHORELINE (miles)	27	17	1	0	0	1	3	1	0	0	2	1	5	1	**7**
NET SHORELINE (miles)	24	15	1	0	0	1	2	1	0	0	1	1	5	2	**7**
STREAMS (miles)	48	31	6	1	1	9	0	0	0	1	0	0	5	9	**14**
STREAMS DENSITY (CU.FT) stream in FT/ watershed area insq FT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
USGS WETLAND (acres)	276	160	13	4	0	27	1	0	0	0	0	0	54	60	**115**
USGS WETLAND100ft BUFFER (acres)	989	653	50	17	0	92	8	0	0	4	0	0	271	210	**481**
NWI WETALND (acres)	702	355	48	1	1	64	2	0	0	2	0	5	131	102	**233**
USDA HYDRIC SOIL (acres)	2,303	1,412	354	7	8	161	8	4	0	14	10	1	607	240	**847**
STRATIED DRIFT AQUIFERS (acres)	937	883	105	0	37	188	314	49	9	96	45	8	15	19	**33**

Summary Table 2

Sensitive Resource Areas	Study Area Total	Ashuelot River Total	Cold River Total
USGS WETLAND (acres)	**505**	116	160
USGS WETLAND100ft BUFFER (acres)	**1,842**	336	653
NWI WETALND (acres)	**1,294**	346	355
USDA HYDRIC SOIL (acres)	**4,261**	891	1,412
STRATIED DRIFT AQUIFERS (acres)	**1,874**	54	883
USDA EXCESSIVELY WELL DRAINED (acres)	**16,889**	1,953	6,693
USDA >25% (acres)	**9,011**	1,988	2,639
DEM > 25% (acres)	**84**	7	36
FLOOD PLAIN (acres)	**2,113**	317	781
USDA PRONE TO FLOODING (acres)	**266**	40	93
RIPARIAN AREA- 100FT BUFFER (acres)	**1,069**	161	908

Table 2.2- Ashuelot River Watershed
Sensitive Resource Areas

			Ashuelot River Watershed											
	Study Area Total	**Ashuelot River Totals**						Dart Brook Subwatershed		*Dart Brook Total*	Thompson Brook Subwatershed			*Thompson Brook Total*
Sensitive Resource Areas			**1**	**2**	**4**	**6**	**12**	**3**	**13**		**11**	**14**	**15**	
USGS WETLAND (acres)	276	116	27	0	4	9	7	23	17	*40*	16	0	14	*29*
USGS WETLAND100ft BUFFER (acres)	989	336	62		13	38	24	73	44	*118*	42	0	40	*82*
NWI WETALND (acres)	702	346	55	0	32	16	6	145	18	*163*	52	0	22	*74*
USDA HYDRIC SOIL (acres)	2,303	891	182	7	52	87	16	297	26	*323*	146	10	68	*224*
STRATIED DRIFT AQUIFERS (acres)	937	54	0	0	0	0	0	54	0	*54*	0	0	0	*0*
USDA EXCESSIVELY WELL DRAINED (acres)	8,646	1,953	209	19	79	51	45	778	56	*834*	476	28	212	*716*
USDA >25% (acres)	4,628	1,988	118	0	55	5	66	597	73	*670*	953	47	74	*1,074*
DEM > 25% (acres)	42	7	0	0	0	0	1	1	0	*1*	4	1	0	*5*
FLOOD PLAIN (acres)	1,098	317	26	0	44	12	0	186	0	*186*	48	0	0	*48*
USDA PRONE TO FLOODING (acres)	133	40	0	0	0	0	0	0	0	*0*	40	0	0	*40*
RIPARIAN AREA- 100FT BUFFER (acres)	1,447	503	48	0	29	10	11	204	9	213	165	0	28	*193*

Table 2.3 Cold River Watershed
Sensitive Resource Areas

			Cold River Watershed												
	Study Area Total	**Cold River Total**	**7**	**8**	**9**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	Warren Brook **5**	Warren Brook **10**	Warren Brook Total
Sensitive Resource Areas															
USGS WETLAND (acres)	276	160	13	4	0	27	1	0	0	0	0	0	54	60	**115**
USGS WETLAND100ft BUFFER (acres)	989	653	50	17	0	92	8	0	0	4	0	0	271	210	**481**
NWI WETALND (acres)	702	355	48	1	1	64	2	0	0	2	0	5	131	102	**233**
USDA HYDRIC SOIL (acres)	2,303	1,412	354	7	8	161	8	4	0	14	10	1	607	240	**847**
STRATIED DRIFT AQUIFERS (acres)	937	883	105	0	37	188	314	49	9	96	45	8	15	19	**33**
USDA EXCESSIVELY WELL DRAINED (acres)	8,646	6,693	888	467	53	1,726	171	16	28	73	67	7	793	2,404	**3,197**
USDA >25% (acres)	4,628	2,639	122	164	19	702	189	10	3	32	6	0	166	1,226	**1,392**
DEM > 25% (acres)	42	36	0	1	5	19	0	0	0	0	0	0	0	10	**10**
FLOOD PLAIN (acres)	1,098	781	98	1	0	84	45	4	0	2	8	9	421	110	**531**
USDA PRONE TO FLOODING (acres)	133	93	18	0	0	0	50	14	0	1	1	8	0	0	**0**
RIPARIAN AREA 100 FT BUFFER (acres)	1,447	944	151	31	29	227	31	13	0	18	17	9	176	242	419

Summary Table 3.1

	Study Area Total	Ashuelot River Total	Cold River Total
Soil Resources			
USDA PRIME FARM LAND (acres)	**2,494**	252	1,070
USDA PRIME FARM LAND-NET (acres)	**2,113**	206	915
FARMLAND- STATE IMPORTANCE (acres)	**3,219**	266	1,394
FARMLAND- STATE IMP-NET (acres)	**2,711**	221	1,180
FOREST SOIL GROUPS (acres)			
I A, IB, IC	**26,352**	3,932	9,781
NET	**24,074**	3,675	8,876
II A, II B	**21,626**	5,810	5,861
NET	**20,852**	5,678	5,588
NC NOT CLASSIFIED	**1,474**	438	376
NC-NET	**1,451**	435	368

Table 3.2- Ashuelot River Watershed
Soil Resources

	Study Area Total	Ashuelot River Totals	Ashuelot River Watershed												
								Dart Brook Subwatershed		*Dart Brook Total*	Thompson Brook Subwatershed			*Thompson Brook Total*
Soil Resources			**1**	**2**	**4**	**6**	**12**	**3**	**13**		**11**	**14**	**15**	
USDA PRIME FARM LAND (acres)	1,323	252	80	11	0	61	0	25	0	*25*	43	1	31	*75*
USDA PRIME FARM LAND-NET (acres)	1,122	206	*62*	*11*	*0*	*58*	*0*	*22*	*0*	*22*	*31*	*1*	*23*	*55*
FARMLAND- STATE IMPORTANCE (ac)	1,659	266	75	2	0	15	8	33	0	*33*	35	15	83	*133*
FARMLAND- STATE IMP-NET (acres)	*1,401*	221	67	2	0	15	8	27	0	*27*	21	9	72	*102*
FOREST SOIL GROUPS (acres)														
I A, IB, IC	13,712	3,932	576	35	127	194	141	1,276	66	*1,342*	830	87	600	*1,517*
NET	*12,552*	3,675	*540*	*35*	*126*	*188*	*141*	*1,221*	*66*	*1,287*	*774*	*72*	*512*	*1,358*
II A, II B	11,670	5,810	983	55	434	95	148	1,800	154	*1,953*	1,712	57	372	*2,141*
NET	*11,266*	5,678	*954*	*55*	*431*	*92*	*148*	*1,759*	*153*	*1,912*	*1,676*	*54*	*356*	2,086
NC NOT CLASSIFIED	814	438	68	0	51	19	16	156	21	*176*	81	0	27	*108*
NC-NET	802	435	*68*	*0*	*51*	*19*	*16*	*153*	*21*	*173*	*81*	*0*	*27*	*108*

Table 3.3- Cold River Watershed
Soil Resources

	Study Area Total	Cold River Total	Cold River Watershed										Warren Brook		Warren Brook Total
			7	8	9	16	17	18	19	20	21	22	5	10	
Soil Resources															
USDA PRIME FARM LAND (acres)	1,323	1,070	209	29	0	247	57	14	0	13	27	8	312	154	**466**
USDA PRIME FARM LAND-NET (acres)	1,122	915	*194*	*25*	*0*	*221*	*51*	*9*	*0*	*13*	*22*	*6*	*249*	*125*	**374**
FARMLAND- STATE IMPORTANCE (acres)	1,659	1,394	215	127	9	414	27	3	7	8	32	4	201	348	**549**
FARMLAND- STATE IMP-NET (acres)	1,401	1,180	197	118	8	354	22	2	5	7	20	1	155	292	**447**
FOREST SOIL GROUPS (acres)															
I A, IB, IC	13,712	9,781	1,639	632	66	2,186	353	40	30	139	124	22	1,857	2,693	**4,550**
NET	12,552	8,876	*1,562*	*613*	*65*	*1,994*	*293*	*22*	*24*	*102*	*77*	*16*	*1,640*	*2,467*	**4,107**
II A, II B	11,670	5,861	922	340	57	1,067	308	22	5	69	39	8	1,107	1,918	**3,025**
NET	11,266	5,588	*891*	*337*	*54*	*1,023*	*279*	*10*	*5*	*57*	*32*	*7*	*1,051*	*1,842*	**2,892**
NC NOT CLASSIFIED	814	376	28	3	0	47	15	4	0	3	0	0	188	90	**277**
NC-NET	802	368	*28*	*2*	*0*	*45*	*12*	*2*	*0*	*2*	*0*	*0*	*186*	*89*	**275**

Summary Table 4.1

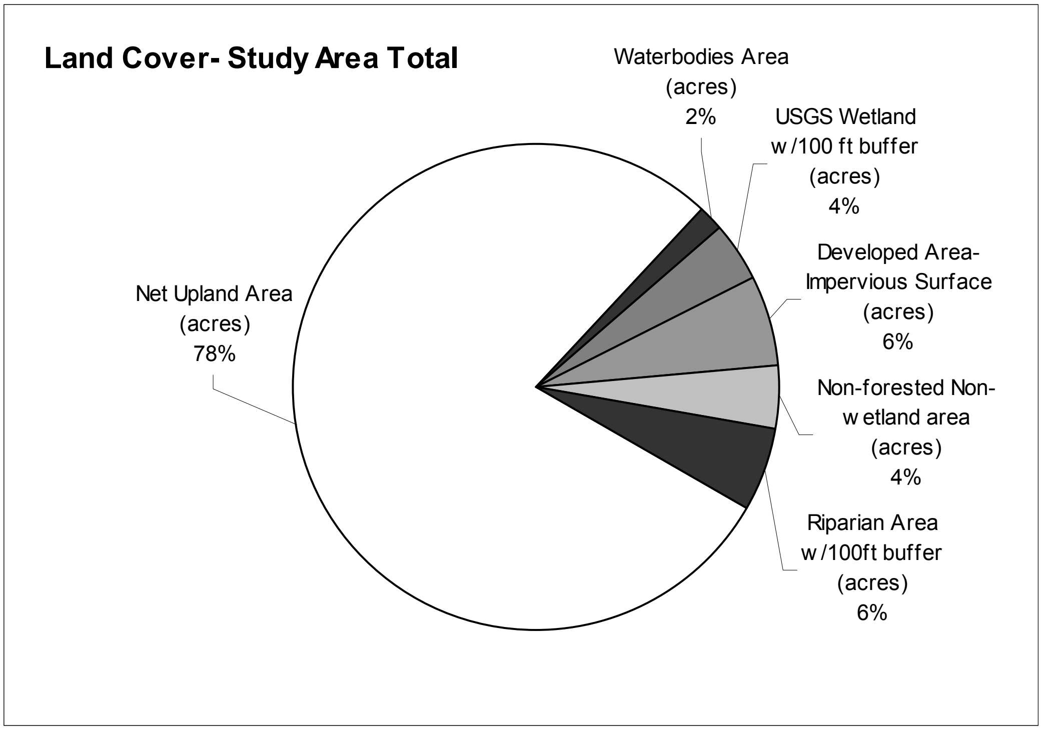
Development Parameters	Study Area Total	Ashuelot River Total	Cold River Total
STRUCTURES COUNT	**1,502**	142	621
AREA OF STRUCTURES (ACRES)	**1,947**	255	741
STRUCTURES DENSITY (BLDG AREA/ WS AREA)	**4**	0	2
BLDG NUMBER / WATERSHED AREA)	**3**	0	1
ROADS (acres)	**169**	24	62
DEVLOPED AREA -IMPERVIOUS SURFACE (acres)	**3,136**	378	1,222
% WATERSHED AREA IMPERVIOUS	**4**	0	2
NPS POLLUTION SOURCES (COUNT)	**51**	12	18
PUBLIC WELLS (COUNT)	**12**	3	3
WELLHEAD PROTECTION AREAS (acres)	**842**	123	298
NON-FORESTED, NONWETLAND AREA (Acres)	**1,447**	503	944

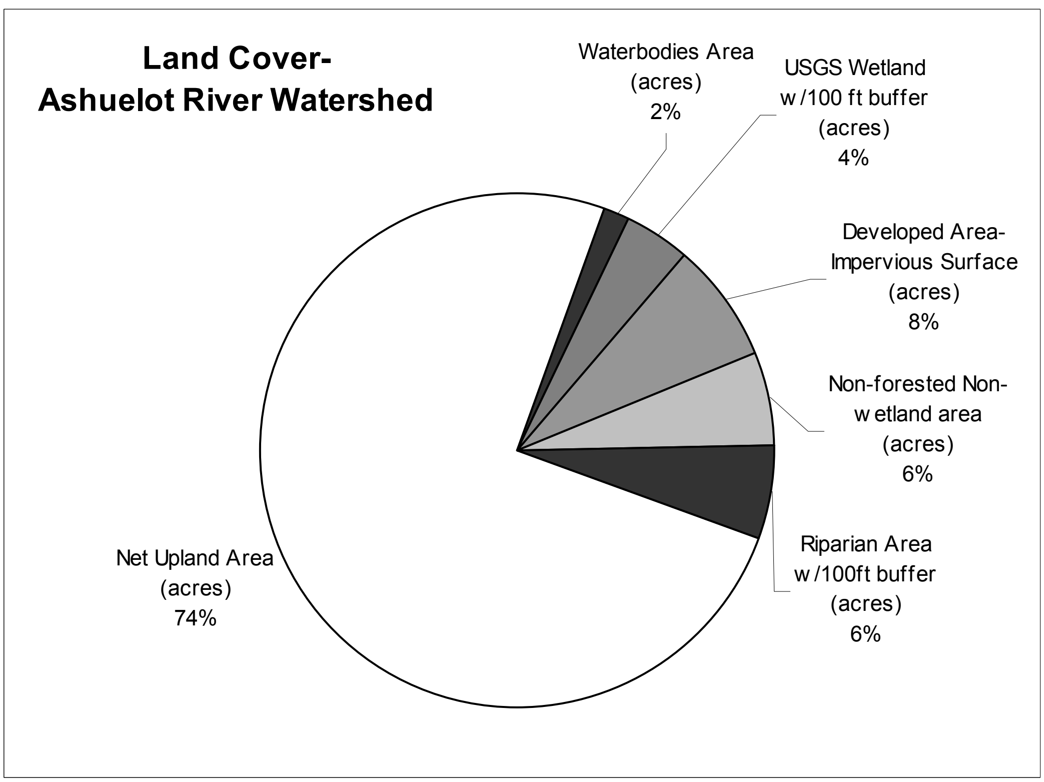
Table 4.2- Ashuelot River Watershed
Development Parameters

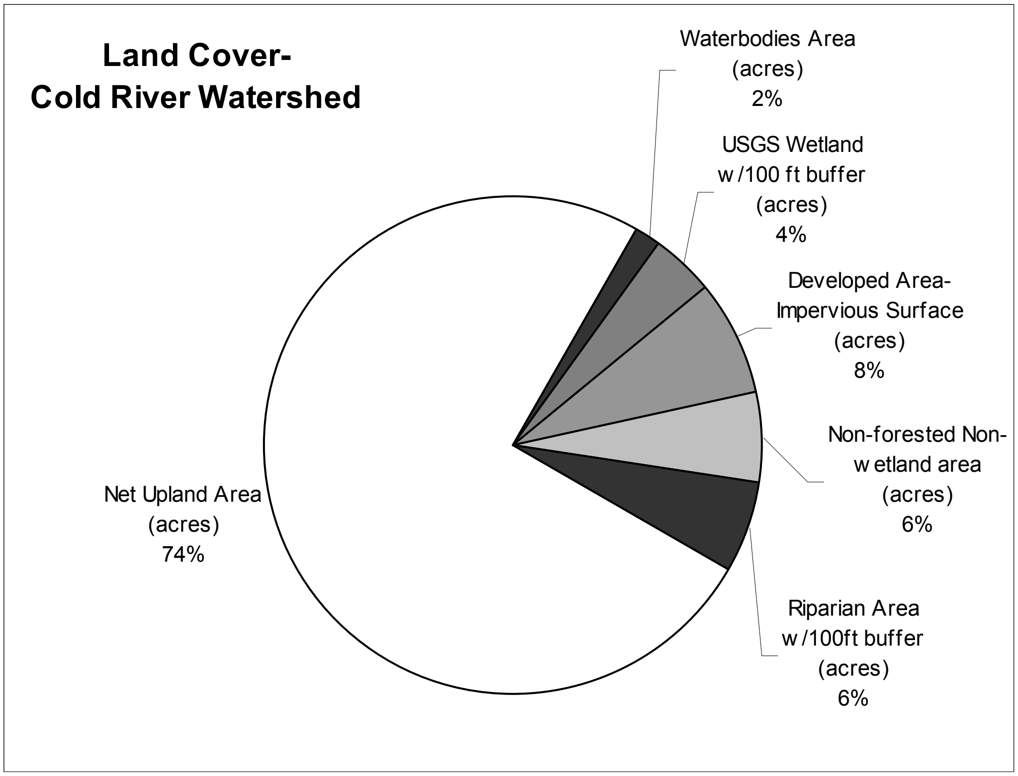
	Study Area Total	Ashuelot River Totals	Ashuelot River Watershed												
								Dart Brook Subwatershed		*Dart Brook Total*	Thompson Brook Subwatershed			*Thompson Brook Total*
Development Parameters			**1**	**2**	**4**	**6**	**12**	**3**	**13**		**11**	**14**	**15**	
STRUCTURES COUNT	763	142	20	0	0	4	0	33	0	*33*	30	8	47	*85*
AREA OF STRUCTURES (ACRES)	997	255	39	0	0	7	0	51	0	*51*	56	14	88	*158*
STRUCTURES DENSITY (BLDG/WS AREA)	2	0	0	0	0	0	0	0	0	*0*	0	0	0	*0*
BLDG NUMBER / WATERSHED AREA)	1	0	0	0	0	0	0	0	0	*0*	0	0	0	*0*
ROADS (acres)	87	24	3	0	1	0	0	10	0	*10*	5	1	4	*10*
DEVLOPED AREA -IMPERVIOUS SURFACE (acres)	1,600	378	51	0	4	9	0	99	1	*99*	93	18	103	*214*
% WATERSHED AREA IMPERVIOUS	2	0	0	0	0	0	0	0	0	*0*	0	0	0	*0*
NPS POLLUTION SOURCES (COUNT)	30	12	4	1	4		0	2	0	*2*	1	0	0	*1*
PUBLIC WELLS (COUNT)	6	3	0	0	0	0	0	3	0	*3*	0	0	0	*0*
WELLHEAD PROTECTION AREAS (acres)	421	123	0	0	0	0	0	123	0	*123*	0	0	0	*0*
NONWETLAND NONFOREST AREA (AC)	1,069	161	41	4	11	22	0	0	0	*0*	28	5	48	*82*

Table 4.3- Cold River Watershed
Development Parameters

	Study Area Total	Cold River Total	Cold River Watershed										Warren Brook		Warren Brook Total
			7	8	9	16	17	18	19	20	21	22	5	10	
Development Parameters															
STRUCTURES COUNT	763	621	42	7	2	107	80	24	4	33	42	4	143	133	**276**
AREA OF STRUCTURES (ACRES)	997	741	62	12	4	186	84	30	7	47	53	7	23	227	**249**
STRUCTURES DENSITY (BLDG/WS AREA)	2	2	0	0	0	0	0	0	0	0	0	0	0	0	**0**
BLDG NUMBER / WATERSHED AREA)	1	1	0	0	0	0	0	0	0	0	0	0	0	0	**0**
ROADS (acres)	87	62	11	2	1	13	3	1	0	2	1	0	13	15	**28**
DEVLOPED AREA -IMPERVIOUS SURFACE (acres)	1,600	1,222	118	22	13	244	91	31	8	53	55	7	279	303	**581**
% WATERSHED AREA IMPERVIOUS	2	2	0	0	0	0	0	0	0	0	0	0	0	0	**0**
NPS POLLUTION SOURCES (COUNT)	30	18	2	1	0	2	4	1	0	0	2	0	1	5	**6**
PUBLIC WELLS (COUNT)	6	3	0	0	0	0	2	0	0	0	0	0	1	0	**1**
WELLHEAD PROTECTION AREAS (acres)	421	298	0	0	0	0	107	0	0	0	28	0	151	11	**163**
NONWETLAND NONFOREST AREA (AC)	1,069	908	24	29	3	222	45	5	13	24	27	10	192	215	**407**


Land Cover- Study Area Total
Waterbodies Area (acres) 2%
USGS Wetland w/100 ft buffer (acres) 4%
Developed Area-Impervious Surface (acres) 6%
Non-forested Non-wetland area (acres) 4%
Riparian Area w/100ft buffer (acres) 6%
Net Upland Area (acres) 78%


Land Cover-
Ashuelot River Watershed
Waterbodies Area (acres) 2%
USGS Wetland w/100 ft buffer (acres) 4%
Developed Area-Impervious Surface (acres) 8%
Non-forested Non-wetland area (acres) 6%
Riparian Area w/100ft buffer (acres) 6%
Net Upland Area (acres) 74%


Land Cover-
Cold River Watershed
Waterbodies Area
(acres)
2%
USGS Wetland
w/100 ft buffer
(acres)
4%
Developed Area-
Impervious Surface
(acres)
8%
Non-forested Non-
wetland area
(acres)
6%
Riparian Area
w/100ft buffer
(acres)
6%
Net Upland Area
(acres)
74%

OPEN SPACE

Providing for the preservation of open space is an important aspect of town planning. Open space provides many benefits to a community:

- Maintenance of rural character and pleasant scenery.
- Provides buffers between developments.
- Wildlife habitat protection.
- Groundwater protection, water retention, and groundwater recharge.
- Flood control.
- Food production.
- Air purification and the production of oxygen.
- Recreational opportunities.

FEDERAL, STATE AND LCHIP PROPERTIES

The following table shows the amount of federal and state owned open space conservation lands, as well as all parcels protected under the Land and Community Heritage Investment Program (LCHIP) in Alstead and surrounding towns.

TABLE 3- NEIGHBORING OPEN SPACE COMPARISONS

Town	Open Space (acres)	Total Acres	% of Town	% of Subregional Area
ALSTEAD	1,434	25,012	5.7%	10.9%
Walpole	2,798	23,469	11.9%	21.3%
Langdon	784	10,496	7.5%	6.0%
Marlow	1,524	16,918	9.0%	11.6%
Gilsum	1,159	10,678	10.9%	8.8%
Surry	2,365	10,245	23.1%	18.0%
Acworth	3,077	24,960	12.3%	23.4%
Total	13,141	121,778		100%

Source: Southwest Region Planning Commission GIS

Alstead has a low percentage of Federal, State and LCHIP lands in terms of both the total area of the town and the subregional total (5.7% and 10.9% respectively). The Town of Surry has the highest percentage of its town as open space (23.1%) whereas Acworth has the highest percentage of the subregional area as open space (23.4%).

CURRENT USE

The Current Use Taxation program was enacted in 1973 to promote the preservation of open land in the state by allowing qualifying land to be taxed at a reduced rate based on its current use value as opposed to a more extensive use. The minimum land area currently needed to qualify is ten acres. The price of this favorable treatment is a 10 percent penalty tax (10% of the sale price) when the property is later changed to a non-qualifying use.

In comparing conservation easements to current use taxation, easements are permanent, while current use may be reversed by change to a non-qualifying use and payment of the Use Change Tax. Thus, current use may satisfy the goals of a landowner who cannot afford to permanently abandon future development value, but desires current property tax relief. If it becomes financially necessary to subdivide, the use change tax becomes an element of the development costs.

The current use designation, authorized by RSA 70-A, provides the town other benefits as well: it encourages landowners to maintain traditional land-based occupations such as farming and forestry; promotes open space, preserving natural plant and animal communities, healthy surface and groundwater; and provides opportunities for skiers, hikers, sightseers, and hunters.

In 2005, 18,051 acres comprising 74% of Town were enrolled in Current Use. In Alstead, the monies collected from the Use Change Tax goes to the Conservation Commission for the acquisition of land and/or conservation easements, up to a $2,000 annual cap.

PROTECTED LAND

There are approximately 937 acres of land in some form of protection in the Town of Alstead. Below is an inventory showing the reported and calculated size of each tract, the protection type(s) and the protecting agency/entity.

Reported Size of Tract*	Name	Protection Type	Secondary Protection Type	Protecting Agency/ Entity
2.87 (66.8 in Marlow)	Feuer State Forest	Fee Ownership		NH Dept. of Resources & Economic Dev. (DRED)
219.1	Hall	Conservation Easement		Society for the Protection of NH Forests
77.3 on 3 lots	Burroughs	Conservation Easement	Executory Interest	Society for the Protection of NH Forests
38 as parts of contiguous lots	Hatch	Conservation Easement		Patten Environmental Trust, Inc.
70.0	Lorandeau	Conservation Easement		Patten Environmental Trust, Inc.
88.9 on 2 contiguous lots	Covillion	Conservation Easement		Patten Environmental Trust, Inc.
273.7	Gardner - Wellman Pond	Fee Ownership with Conservation Easement	Town Owned	Society for the Protection of NH Forests LCIP (NH OEP)
93.70 (253 in Gilsum)	Tibbetts / Blanchflower Lumber	Right of way - Deed Restriction		Society for the Protection of NH Forests
25.8	Tibbetts / Gilman	Right of way -Deed Restriction		Society for the Protection of NH Forests
66.63 on 2 lots	Montgomery	Conservation Easement		Society for the Protection of NH Forests
100	Stevens	Conservation Easement	Executory Interest (Alstead)	Monadnock Conservancy

*Size of tract as reported on the deed/tax map