Soils

Soil surveys are becoming increasingly valuable to planners in rural and developing areas. To a large extent the development patterns that have emerged through the years have done so in response to limitations or potentialities of the soil. In estimating the extent and location of future growth and development the characteristics of the soils should be carefully considered so that problems and subsequent expenses associated with poor and unsuitable soils can be avoided as much as possible.

Areas having no public or communal sewage systems must rely on private systems such as septic tanks and cesspools. Those who must have a private sewage disposal system undoubtedly hope for many years of trouble-free service. How long and how well a septic system works depends to a very large extent on the absorbtive qualities, or the permeability, of the soil. Slowly permeable soils require much larger filter fields and therefore bigger lots than are necessary with more rapidly permeable soils. In some areas soils are so impervious that septic tank filter fields would be unsafe regardless of the lot size.

Poorly drained soils also impose severe limitations on growth, especially residential development. Soils with high water tables and poor internal drainage fill with water during wet weather and sometimes remain wet for long periods after heavy rains. Some soils in low and swampy areas are permanently wet. When soils are wet there is no capacity left to absorb septic tank effluent and filter fields are not able to function. Those soils which are wet for long periods of time due to poor drainage or a high water table are not appropriate for residential development unless land is at a premium. In that case, utilities are generally provided and the main problems remaining are wet yards and basements.

In Dryden there are some 85 different types of soils and the variation and mixture is extreme. In general terms the soils can be classified as having either gravelly,

clayey or fragipan characteristics. The gravelly soils are located primarily in the stream valleys but also occur in kame, esker and moraine areas. Clayey soils are located in areas that were formerly lake bottom where lake-laid clay sediments have been deposited. These clayey soils are limited in extent and are located mainly in western and northern extremes of the town along Fall Creek and in the Owasco Inlet valley. Fragipan soils predominate in Dryden. They have a compact, dense, impervious layer at varying depths in the upper subsoil which greatly impedes movement of water through the soil. Water often moves laterally across the surface of the fragipan layer. Waterborne sewage effluent can, therefore, cause contamination in wells and ditches some distance away.

The two major soil characteristics which affect the location and extent of development - permeability and drainage - have been mapped for Dryden. Moderately permeable soils are dominant in the town with approximately 39,370 acres or 64.8 percent of the area being so classified. Slowly permeable soils account for an additional 25.9 percent or 15,750 acres.

About 5,270 acres or 8.7 percent of the area has rapidly permeable soils and the remaining .6 percent or 345 acres falls at the other extreme as being very slowly permeable. The slowly permeable soils are to be found in all areas of the town except the northwest. Slowly permeable soils are predominant in the Ellis Hollow area and in the Fall Creek valley from Varna to Etna. Another concentration of this type of soils runs through the eastern half of Freeville and north into the Owasco Lake inlet.

Rapidly permeable soils are also scattered throughout the town but tend to concentrate in creek valleys. The largest concentrations of this type of soil form a crescent shape in the eastern portion of the town that stretches from the McLean area through the center of the village of Dryden and out the Route 38 valley to the southeast. It is interesting to note that the most dense development in both villages has occured on those soils which are rapidly permeable.

Soil drainage patterns in Dryden are complex and intricately mixed. Well and moderately well drained soils make up 36,260 acres or 59.7 percent of the town area. This type soil is scattered throughout the town with main concentrations located in the hilly southern half where other conditions, such as permeability, steepness and ownership patterns retard intensive development. Somewhat poorly drained soils account for 14,270 acres or 23.5 percent of the town area. There are no predominant concentrations of this type of soils but they tend to be grouped more consistently in the western half of the town. There are somewhat poorly drained soils north of both villages and on the slopes east of the village of Dryden.

Approximately 16.8 percent of the land area, or 10,205 acres, are classified as very poorly drained. Generally speaking the northern half of the town contains most of the poorly drained soils with the flat northwestern quadrant, the West Dryden area, being the location of the most consistent problems of drainage and very wet soils. There is an area of very poor drainage running across the northern portion of the village of Dryden and several similar areas in the northeastern and southwestern portions of Freeville.

Because of the extremely irregular distribution of soils in Dryden it is possible to find well drained, poorly drained and very poorly drained soils in the same relatively small area and sharp differentiations in quality are found side by side along many of the built-up roads. The same conditions apply to permeability characteristics. Also, soil types in Dryden which are slowly permeable aren't necessarily always poorly drained. Hudson, Bath, Langford and Mardin soils are examples of this: well drained but slowly permeable. On the other hand some soils like Ellery and Halsey types are poorly drained but moderately permeable. Rapidly permeable soils of the Chenango, Howard and Palmyra types are also well or moderately well drained. These are located in spots primarily in the Fall Creek and Virgil Creek valleys with another grouping spotted along Ellis Hollow Creek Road.

Because of the highly variable and sometimes extreme characteristics of the soils in Dryden each area must be evaluated in terms of its own possibilities and limitations. Any extended concentrations of relatively dense residential development will almost certainly require some type of public or communal sewer system. Densities in the poorer soil areas should be kept low and, in areas where drainage is very poor and permeability is slow, such as in the Owasco inlet area, development should be discouraged as much as possible. Development in the poorly drained areas of West Dryden and north and east of Etna will face the problems of swampy and wet ground conditions and low absorbative capacity for sewage effluent. Sewers in these areas would relieve the effluent problem but proper and effective drainage of proposed developments will be necessary in these areas and should be reviewed with caution. Slowly permeable soils in the Ellis Hollow area, and especially along Snyder Hill Road, will cause sewage disposal problems unless sewers are provided. Large lot subdivision in much of this area will still be possible but may not be compatible with the increasing pressures for residential development and increasing land value in an attractive area on the fringe of Cornell and the Ithaca urban center.

Ground Water

Dryden, like the rest of Tompkins County and all of the southern counties in Upstate New York, is underlain by layers of unconsolidated deposits of sand, gravel, till, clay and silt which in turn are underlain by bedrock of the shale type. Ground water is obtained from both the bedrock and from the irregular layer of unconsolidated deposits that cover the bedrock.

Ground water is rain or snow which has seeped, or percolated, from the surface of the earth down through the top layers of earth into the underlying unconsolidated deposits and bedrock by means of an intricate network of interconnected cracks and small openings. The water table represents the level to which water has filled these natural

cracks and openings in the underlying materials. The amount of water which can be stored in the unconsolidated deposits and bedrock is determined by the porosity of the material; i.e., the number and size of voids in a given volume of material which has the capability to receive and store water.

The shale bedrock underlying Dryden is one of the least productive of the bedrock types. Most of the unconsolidated deposits spread over the bedrock in Dryden are also relatively unproductive since they consist largely of till, clay and silt. There is, however, an extensive deposit of sand and gravel underlying the area in the vicinity of the villages of Freeville and Dryden at a depth of about 200 feet according to the United States Geological Survey. Sand and gravel is the most productive water bearing material in the state. In Freeville well records show that the water bearing sand and gravel deposit lies under most of the flat valley area in the village and extends about a half mile up and down stream from the village limits. Water in this deposit is under high artesian pressure and most wells tapping it flow above the ground surface. According to the Geological Survey yields of 500 gallons per minute or more might be obtained from this deposit.

Substantial quantities of ground water may also be available from potential aquifers which are scattered throughout the entire Virgil Creek valley from about a half mile north of the village of Dryden southeast to the town boundary. Layers of sand and gravel are found included at various depths in the thick deposits of unconsolidated material which exist in that area. Properly constructed wells might produce 200 gallons per minute or more from some of these coarse layers.

Wells in most of the remaining area of the town are able to produce sufficient quantities for domestic use and there are a few scattered locations where somewhat larger quantities are available. Responses to the Citizen Questionnaire (see Appendix) indicate that 80.1 percent of the respondents had some type of well, spring or cistern

as a source of water. Nine percent replied that this source was not adequate and 6.3 percent of these indicated that the water source occasionally dried up.

The seasonal fluctuation of ground water levels is greatest on hills and can be as much as 15 to 20 feet. The water table in till deposits also experiences large seasonal fluctuations and often results in dry or low yield wells in the late summer and early fall. Deepening the well, in many cases, increases the yield.

Except for those areas around the two villages and in the Virgil Creek valley, a sufficient ground water supply in Dryden to satisfy heavy non-domestic needs would be questionable. Multiple driven wells or large-diameter dug wells combined with storage facilities might provide an adequate supply in some areas if the need were not too large. Detailed investigation of the potential supply should be made, however, if ground water resources are to be used.

Climate

Dryden and Tompkins County lie in the path of most of the major weather systems as they pass across the North American continent. This location results in highly variable weather with temperatures and atmospheric conditions tending to change from day to day and week to week. In contrast to the fluctuating weather is the cloud cover which tends to be unusually persistent, especially in winter months.

Temperature in Dryden is moderate with the average maximum around 79° and average minimum around 15°. Extremely cold or hot temperatures occur occasionally but temperatures below minus 20° and above 95° are rare and these extreme conditions are of short duration. Varying topography in Dryden affects temperatures and such climatic conditions as air drainage and the snow melting period. High elevations in the southern portion of the town have

slightly colder winter temperatures and also cooler summers. In the deep valleys of the southern hill section where air flow is bad the temperature is generally colder than elsewhere and freezes are likely to come earlier in the fall and continue late in the spring.

Precipitation in the area is fairly heavy with an expectation of about 38 inches per year. About half of this amount of rain falls during the five month growing period from May through September. While precipitation during the growing period is fairly evenly distributed there are occasional heavy rainfalls as well as periods of drought. In July, 1935, for example, the heaviest rainfall of record occurred. On the other hand, according to Weather Bureau data, in approximately two growing seasons out of 15 rainfall will be deficient for a long enough period to seriously affect crop growth.

Prevailing winds are generally from the northwest, but summer variations occur with a principle tendency towards southwest winds. High velocity wind storms are not a serious problem but some crop and property damage does occur during locally severe thunder storms which produce sudden high winds and occasional hale. Winter storms are probably the most troublesome with occasional heavy and wet snows and freezing rains causing inconvenience and some damage to trees and property.