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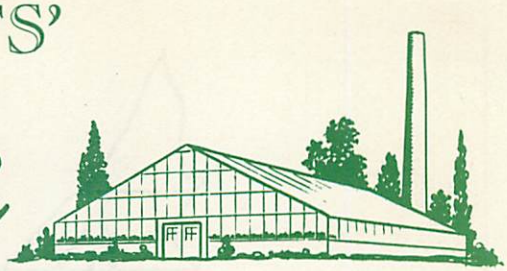

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LOCATING AND IMPROVING WATER WELLS FOR GREENHOUSES AND NURSERIES

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One of the major factors to be considered in the operation of a modern greenhouse or nursery business concerns the availability of a good water supply. Such a water supply must not only be sufficient in quantity but must also be of a satisfactory quality in order to prevent scaling in the boiler feed-lines or injury to the plants themselves.

Some greenhouse and nursery operators are fortunate in being located close enough to municipalities so that city water supplies are available. In other cases the water may be pumped from surface supplies, such as lakes, ponds or streams. Most greenhouses, however, are not conveniently located with respect to surface water supplies and, as a result, groundwater sources in the form of wells are extensively used.

The total cost of a well may be large or small depending on the conditions encountered. If the free water table happens to be located within a few feet of the ground surface, it may be possible to drive a simple and inexpensive well point into the waterbearing formation, and thereby obtain a satisfactory water supply at a minimum of cost. On the other hand, wells that must be drilled into formations located far below the ground surface may cost up to several thousands of dollars.

Factors to Consider in Planning a New Well

Your chances of obtaining a water supply from a shallow driven well can be determined either by exploratory digging with an ordinary post-hole auger, or by consulting your local well driller. Through his past experience, the latter may have a wealth of information about the conditions you are likely to encounter.

If driving a well point appears to be feasible, select one of about 2 inches in diameter and made of corrosion-resistant metal, for greater durability. If the yield from one such point is not sufficient to meet the full needs, it is usually better to install additional points rather than one which is larger in diameter.

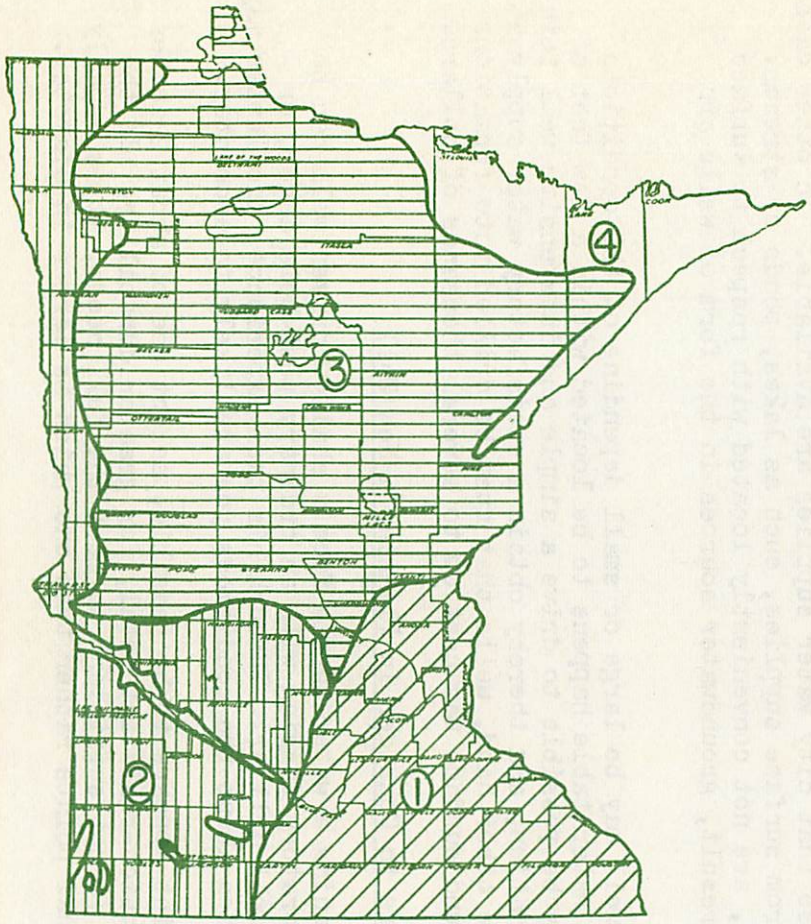

Figure 2 Relative possibility of obtaining water from deep wells in Minnesota: Area #1, good; Area #2, questionable; Area #3, difficult; and Area #4 and other unshaded areas, very difficult.

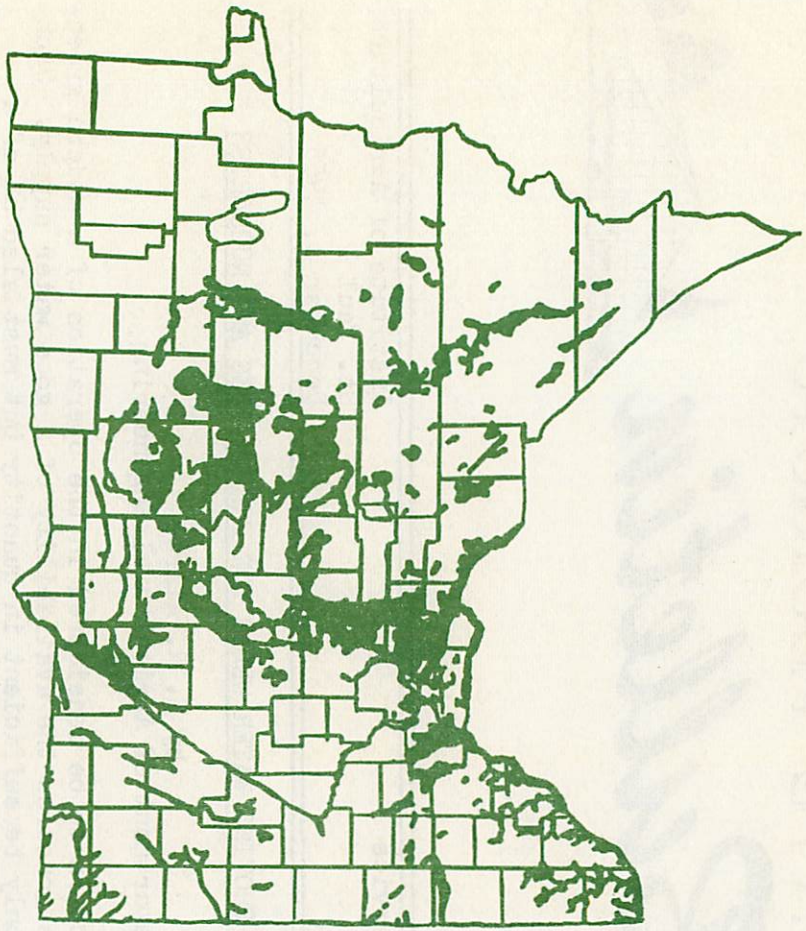

Figure 1 Location of major areas having appreciable deposits of sand and gravel in drift. These deposits are usually favorable for shallow wells.

For ideal conditions well points are most successful where the water table is located in a sand or gravel formation, and within 10 to 15 feet from the ground surface. Figure 1 shows the approximate location of the major waterbearing sand and gravel deposits in Minnesota.

Should it become necessary to construct a deep well, your particular location within the state again largely determines the cost and your chances of success.

In Figure 2 the state is divided into four separate areas numbered 1 through 4. The number assigned to each area indicates the relative ease with which water can be obtained from a deep well.

For example, if you live in area No. 1, your chances of obtaining an abundant water supply from a deep well are good because this area is underlain by several different formations of waterbearing-sedimentary rocks. Unfortunately, from the standpoint of water supply, the remainder of the state is underlain with granite which is found at varying distances from the ground surface. Granite is very dense, contains few cracks and fissures, and therefore provides little capacity for ground water accumulation.

In area No. 2 the depth of the glacial drift covering the granite, however, is sufficiently deep (100-200 feet) in most places so that chances of obtaining a good well are still fair.

In area No. 3 the chances of obtaining a good well are less than in area No. 2, simply because the depth of glacial drift covering the granite is not so great.

All areas unshaded and/or designated by the number 4 show where ground water supplies are extremely difficult to obtain. In these areas the granite rock may outcrop at or near the ground surface, thus furnishing little or no cover that might serve as a place to accumulate and store ground water. As with shallow wells, your chances of obtaining a suitable water supply from a deep well, together with its probable cost, can best be determined by consulting your local well driller.

Increasing the Yield of Existing Wells

In some instances it may be found that your present well is no longer capable of supplying the amount of water needed to meet your demands. Such a shortage may be due to an increase in the amount of water being used, or it may be that, for some unapparent reason. the yield of your present well has diminished with time.

Several factors may cause the yield of a well to go down. One of the most common sources of trouble is brought about by the gradual deposition of minerals (usually lime) on the well screen. As a water which is heavily laden with calcium is pumped through a screen, minute quantities of the calcium are deposited on the metallic surfaces of the screen or casing, and on the gravel or rock formation immediately surrounding the screen. Although this process, called incrustation, is usually quite slow, it may eventually cause a decrease in yield as the well becomes older.

Whenever it is possible to do so, incrustation may be greatly retarded by keeping the pumping rate as low as possible. In other words, if a given total quantity of water is needed, pumping the required amount slowly and over a longer period, rather than excessive rates for short periods, will lessen the tendency for incrustation. If the incrustation has already taken place, the condition can be relieved by lifting the drop-pipe and screen completely out of the well. After

this has been done, the calcium deposits can be removed by scraping or by making light applications of commercial muratic acid to the screen with a brush.

Where it is inconvenient to remove the screen from the well, it may be possible to leave the well intact and insert the acid directly into the well. If this is done, the acid should enter the well through a black pipe, or by means of a rubber or plastic hose, extending downward to a point near the screen. By means of a funnel the acid is poured into the pipe or hose and, if possible, allowed to remain for several hours, Enough acid should be used to fill the screen completely (in most small wells two gallons is sufficient).

Care should be used in handling the acid to avoid injury to personnel or property. Goggles, rubber gloves and plenty of ventilation in the pumphouse or basement should be provided. After the acid has been allowed to remain in the well for several hours, the well should be pumped for about one and one-half to two hours, until no trace of the acid remains.

Other conditions that may cause a decrease in the yield of your present well are brought about by over-pumping or interference from other wells in the same area. If new and deeper wells have been located nearby, it may be that the original water table has been lowered beyond the reach of your present screen. In such cases it may be possible to have your present well deepened in order that you might again come in contact with the ground water reservoir.

Although deepening a well may result in your having to change to a different pump, it is still less costly than building a completely new well in a different location. If the present well already extends to the bottom of the formation, however, it may not be possible to deepen it, unless by so deepening a new source of water can be tapped.

As a general rule, it is impractical to attempt to increase the yield of a well strictly by increasing its diameter. In most cases, doubling the diameter of a well will only increase the yield by about 10 to 15 per cent. While it is true that most high-producing wells are of the larger diameters, the pumping equipment to be used is frequently the factor which determines the size of well required.

When information of any sort is desired concerning a new or existing well, it is highly recommended that you consult and work closely with the best source of information you have--your local well driller.