

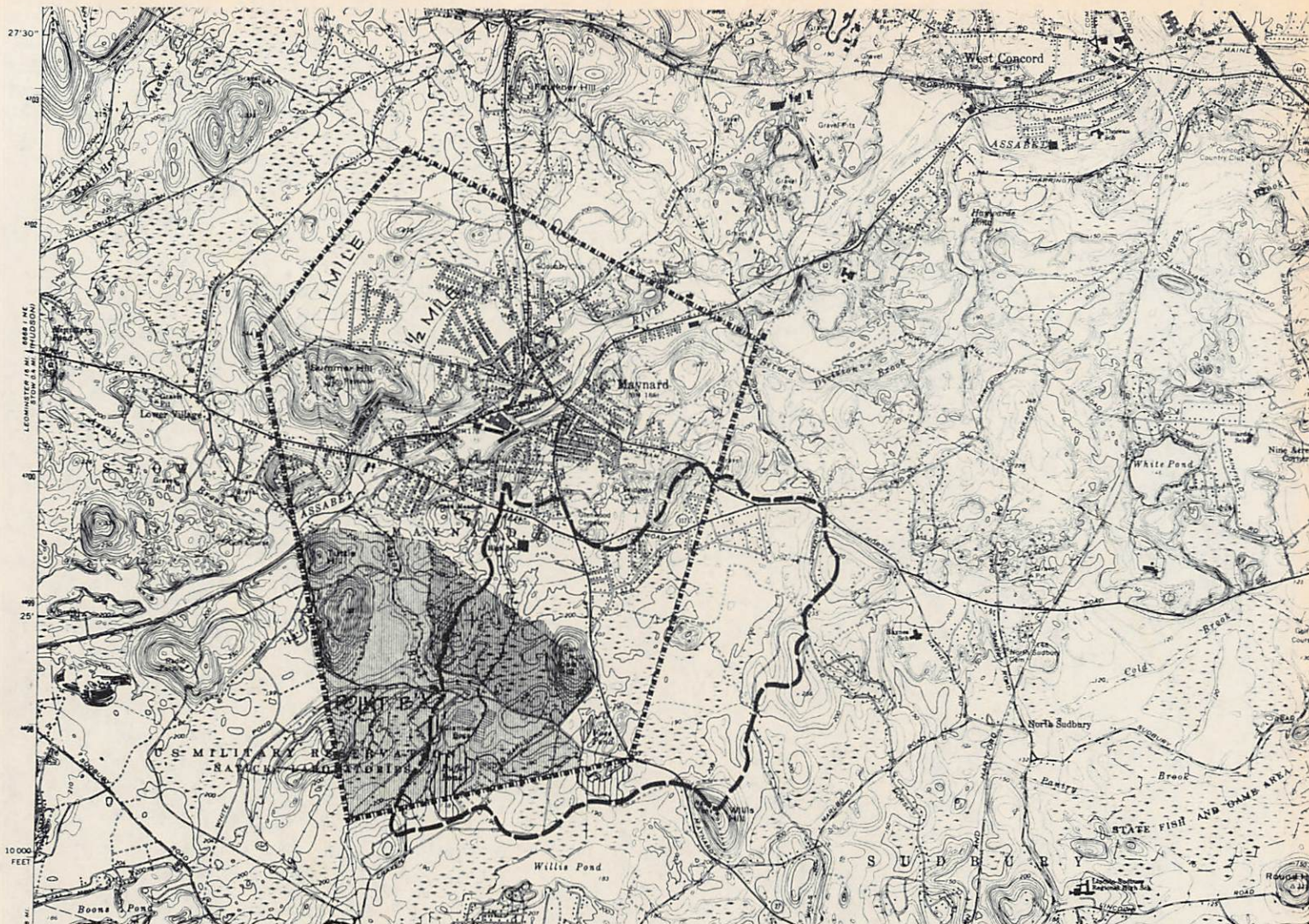
AN OPEN SPACE STUDY
FIRST PHASE TAYLOR BROOK WATERSHED
MAYNARD, MASSACHUSETTS
1972

prepared by:





Zuelke, Larson & Freitas
OPEN SPACE CONSULTANTS

CONSERVATION COMMISSION

MAYNARD, MASSACHUSETTS



LEGEND

-  MAYNARD TOWN BOUNDARY - TOTAL ACREAGE 3,360
5.24 SQUARE MILES
-  AREA OF STUDY PHASE I TOTAL ACREAGE 490±
-  U.S. MILITARY RESERVATION LAND IN MAYNARD
COVERAGE IS 20%± OF TOTAL TOWN ACREAGE.
-  INDICATING AREA OF LAND CONTRIBUTING SURFACE
WATER AT POINT 'B' (WATERSHED AREA)



REGIONAL PLAN

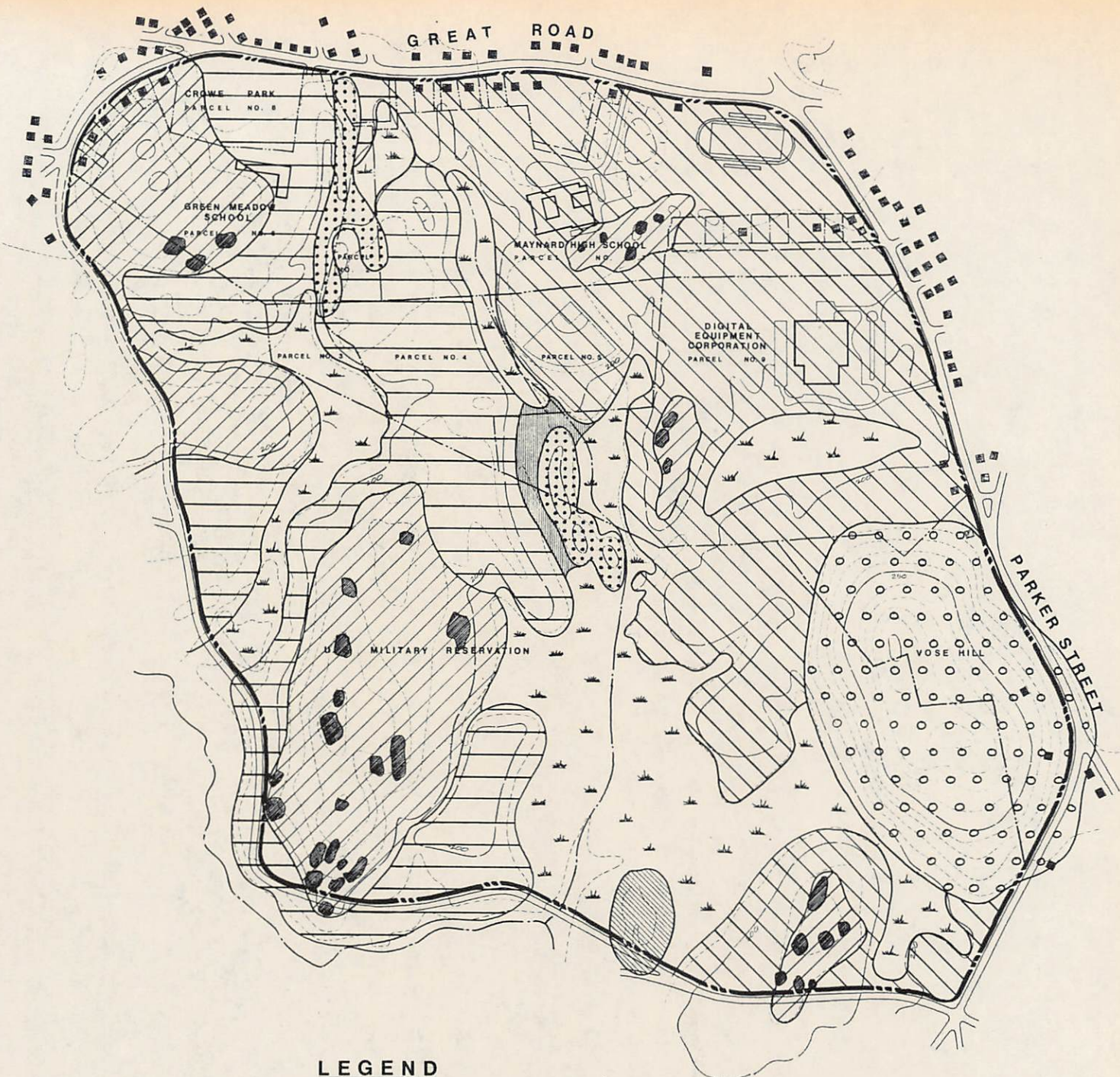
AN OPEN SPACE STUDY

PHASE I .. A PORTION OF THE TAYLOR BROOK WATERSHED
MAYNARD MASSACHUSETTS

DATE MAY 1972
SCALE 1" = 1000'
0 500 1000 2000 4000

PREPARED FOR:
THE MAYNARD CONSERVATION COMMISSION

PREPARED BY LARSON AND FREITUS
LANDSCAPE ARCHITECTURE RESOURCE ANALYSIS AND
ENVIRONMENTAL EDUCATION
LINCOLN MASSACHUSETTS



LEGEND



OUTWASH PLAIN: BROAD PLAINS OF WELL STRATIFIED SAND & GRAVEL BOUNDED ON THE NORTH BY ICE CONTACT SLOPES. CHARACTERIZED BY MANY SWAMPS, PONDS & OTHER CLOSED DEPRESSIONS.



KAME TERRACES: SANDS & GRAVELS COMMONLY WELL STRATIFIED; DEPOSITED BY MELT WATER BETWEEN STAGNANT ICE MASSES & UPLAND OR VALLEY WALLS.



GROUND MORaine w/ ROCK OUTCROPS: BROAD RELATIVELY THIN ACCUMULATIONS OF TILL CHARACTERIZED BY GENTLE, UNDULATORY RELIEF THAT REFLECTS IN A BROAD MEASURE THE SHAPE OF THE UNDERLYING BEDROCK SURFACE.



DRUMLIN: OVAL OR ELONGATED ROUNDED HILLS OF TILL, SIMILAR IN COMPOSITION TO GROUND MORaine.



SWAMP: MOSTLY SAND, SILT, PEAT.



ESKER: ELONGATED RIDGES, CHIEFLY OF MIXED SAND & GRAVEL DEPOSITED IN SUBGLACIAL TUNNELS OR IN OPEN ICE WALLED CHANNELS CHARACTERIZED GENERALLY BY BLUE STRATIFICATION & EXTREME RANGE OF GRAIN SIZE.



SAND & GRAVEL: CHIEFLY DEPOSITS OF FINE SAND, GRAVEL & SILT WITHOUT DISTINCTIVE MORPHOLOGY.



KAME: IRREGULAR MOUNDS OF SANDS & GRAVELS, COMMONLY POORLY SORTED.

SURFICIAL GEOLOGY

AN OPEN SPACE STUDY

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MAYNARD MASSACHUSETTS

DATE: MAY 1972
SCALE: 1" = 200'
0 100 200 400 600 800

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SURFICIAL GEOLOGY:

Much of the land is described as glacial outwash and moraine material, with scatterings of bedrock. Some of the bedrock is exposed as in the vicinity immediately south of the highschool. Bedrock outcrops are also located just west of the Green Meadow Elementary School, and in the moraine material west of the marshland.

The glacial deposits known as moraines, are made up of materials that the glacier carried and dropped at the edge, sides and bottom of the ice pack. Moraine deposits contain a mixture of boulder sizes, sands and clay-like materials. Such deposits do not act as good water absorption material, as it is somewhat impervious to water.

The glacial outwash material was formed when water, moving under the glacier ice, carried fine particle material, depositing it in valleys or depressions between moraines and drumlins. This particular outwash plain contains a good gravel-sand mixture, and therefore acts as good water re-charge material.

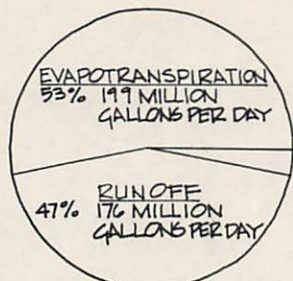
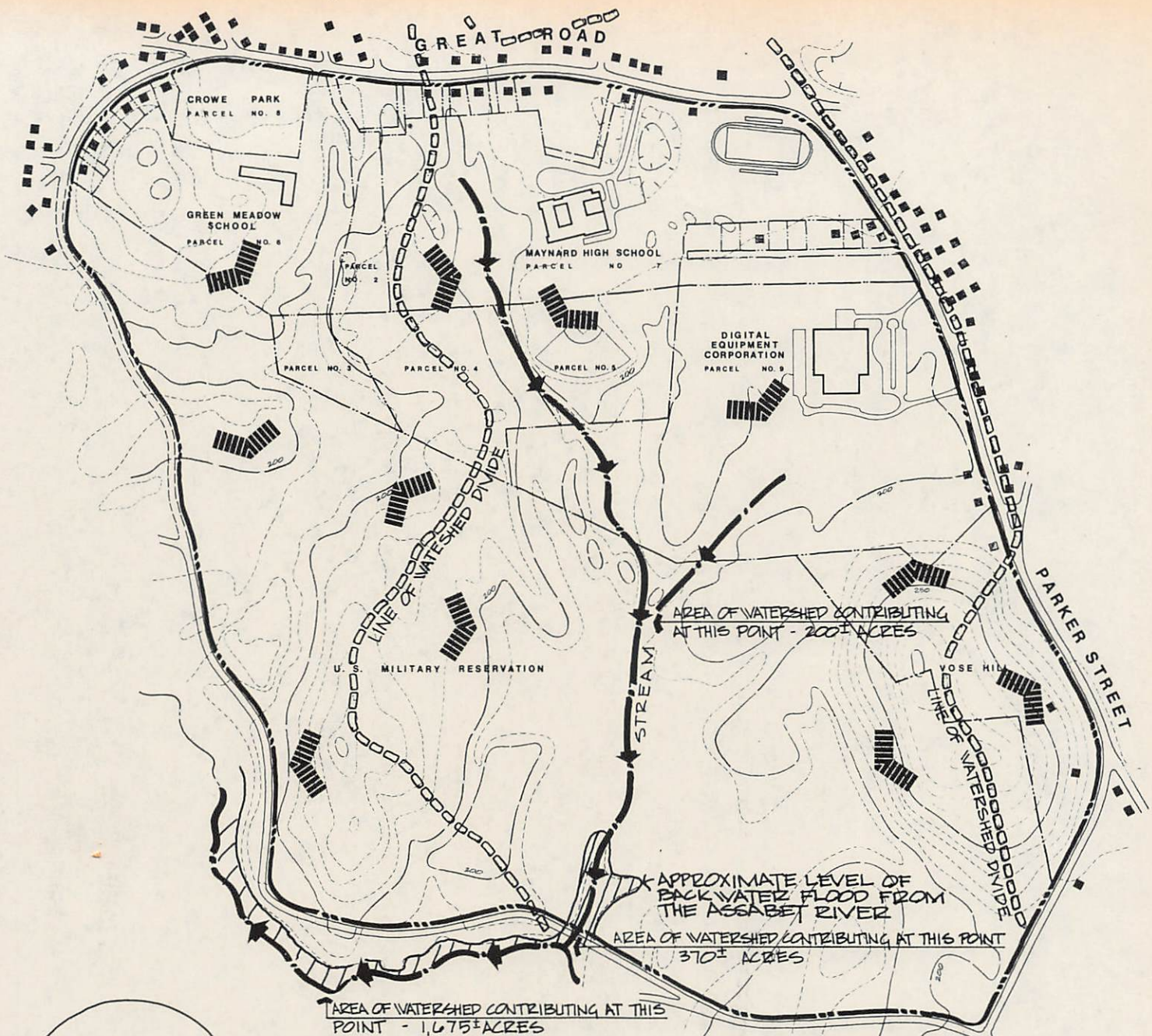
At the south-east corner of the study area, is located a drumlin, called Vose Hill. This particular drumlin is a mixture of gravels, sands and clay-like deposits, in stratified layers. It has an elevation of 300 feet above sea level.

At a point just west of where Taylor Brook tributary enters the marshland, is located a large gravel-fine sand deposit, known as a kame-terrace. Kame terraces are gravel-sand deposits that are stratified, as they were left by the melting of stagnant ice masses. This deposit acts as a surface-to subsurface aquifer. This aquifer

re-charge are, as the name implies, is the point of interchange between the surface water and the subsurface aquifer. New wells for the Town of Maynard have been sited on a portion of this aquifer, within the United States Military Reservation.

The study area also has a number of glacial features which should be preserved. The esker located in and near the north end of the marsh is a classic example. Many of these geological features are lost because they contain valuable sand and gravel deposits which are utilized for fill and building purposes. There is a kame in the south-central portion of the site, also an excellent geological feature which is vulnerable because of its high sand and gravel content.

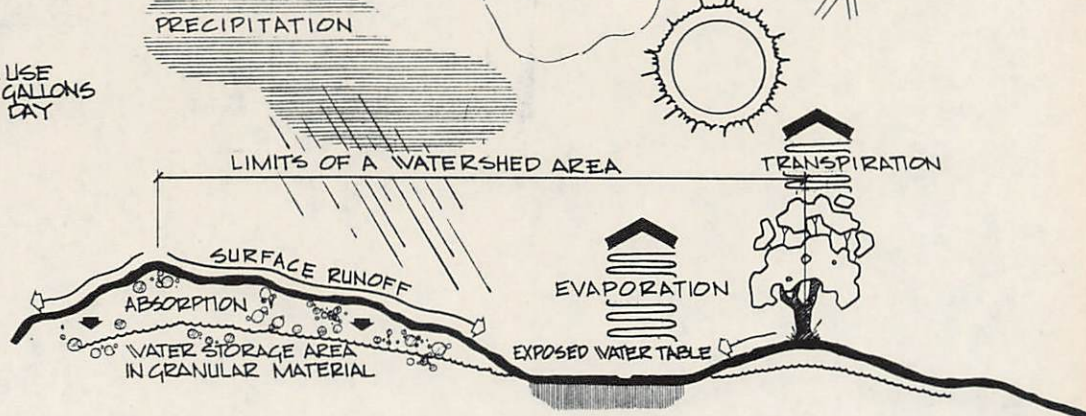
The surficial geology not only provides for excellent water recharge and storage material, but also offers an excellent water storage and geology feature for high school earth science, as an outdoor study area for the schools.



WATER AVAILABILITY AND USE

AVERAGE RUNOFF IN THE ASSABET RIVER DRAINAGE BASIN IS ABOUT HALF OF THE WATER THAT ENTERS THE BASIN AS PRECIPITATION, OF WHICH ONLY A SMALL PERCENTAGE IS USED BY MAN. BASED ON BUDGET FOR 1965

3% WATER USE
6 MILLION GALLONS PER DAY



SURFACE DRAINAGE

AN OPEN SPACE STUDY

PHASE I -- A PORTION OF THE TAYLOR BROOK WATERSHED
MAYNARD MASSACHUSETTS

DATE: MAY 1972
SCALE: 1" = 200'
0 200 400 600

PREPARED FOR:
THE MAYNARD CONSERVATION COMMISSION

PREPARED BY:
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LANDSCAPE ARCHITECTURE, RESOURCE ANALYSIS AND
ENVIRONMENTAL EDUCATION
LINCOLN MASSACHUSETTS

SURFACE DRAINAGE:

The study area is located within a watershed which exceeds the boundaries of the Township of Maynard. The entire watershed is bounded on the North by Great Road and Waltham Street, extending eastward to Mossman Road in Sudbury. The watershed area extends southward, at this point, to Willis Hill, then westward to a point south and west of Puffer. It then extends somewhat northward to the Green Meadow Elementary School and Great Road.





The study area watershed, as shown on the enclosed plan, is bounded on the north by Great Road, with some considered section just north of Great Road. The watershed continues eastward to Parker Road, then southward to where the line of watershed divides Vose Hill. At a point just south of Vose Hill, the boundary swings westward to where the study area stream contributes to Taylor Brook. The westward boundary then swings northward along the top of the glacial moraine material, joining once again at Great Road.

The study area has a contributing surface watershed of approximately 370 acres. This surface drainage flows southward, in two small streams, that join at the head waters of the marshland. From the marsh the stream flows south thence into Taylor Brook. Approximately one-fourth of the area is now developed or disturbed in some manner. Several marshy or wetland sites are interspersed between the two school sites and the large swamp. The wetlands are basically exposures of the watertable within this particular watershed.

Enough rain, snow, sleet and hail falls in an average year to cover the entire landscape with water to a depth of at least thirty inches. Of the total precipitation, about 70 percent never reaches the water table or the stream flow; before it can reach either of the two streams it either evaporates or it is absorbed by plants and transpired through their leaves. This 70 percent usually is not counted in the total water supply, but it does indispensable work, cooling the land and sustaining the wood land areas. The remaining 30 percent of the moisture from rain and snowmelt moves into the soil and becomes a part of the underground watertable. Thus the amount of water that enters the recharge areas is relatively small in comparison to the total amount that falls on the land. The importance of the thirty percent of the moisture that finds its way into soil, lies in the fact it sooner or later becomes a part of the underground water system. This is the same underground water system that is utilized as a water source.



LEGEND

-  SWAMP : EXPOSED WATER TABLE
-  AQUIFERS : WATER TABLE RECHARGE AREA
-  DIRECTION OF MOVEMENT OF UNDERGROUND WATER
-  AREAS OF TILL AND BEDROCK : NOT CONTRIBUTING APPRECIABLE GROUND WATER TO THE MAINTENANCE OF THE WATER TABLE LEVEL.



GROUND WATER

AN OPEN SPACE STUDY

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DATE: MAY 1972
SCALE: 1" = 200'
0 100 200 400 600 800

PREPARED FOR:
THE MAYNARD CONSERVATION COMMISSION

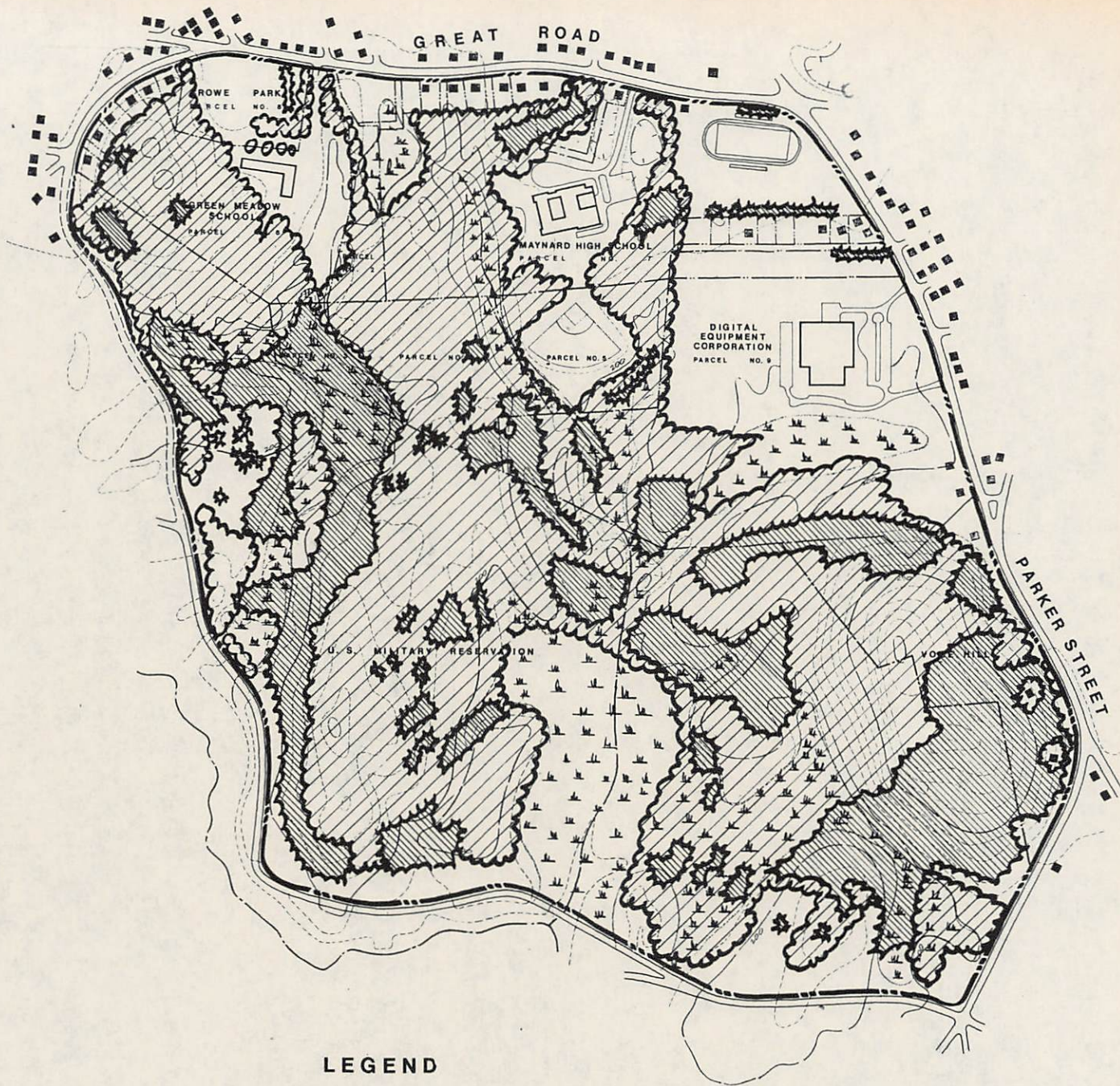
PREPARED BY:
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LANDSCAPE ARCHITECTURE, RESOURCE ANALYSIS AND
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GROUND WATER:

The greatest portion of the study area is considered watertable recharge material, because of the underlying sand and gravel deposits. These sand and gravel deposits comprise the Kame terraces, the outwash plain and the drumlin, which act as aquifers for the storage of ground water. Therefore, there is a inter-relationship between the gravel-sand areas, recharge areas and the storage of ground water. Surface water enters the soil at these points and contributes much of the water that is held in the aquifers.

Surface water that does not penetrate the soil, because of the high water table, in much of the area, runs off into two small streams that flow into the bog-marshland. Water that flows over the surface of the moraine and drumline material will also contribute to the ground water supply. Part of the rainwater or snowmelt that sinks into the ground becomes ground water, percolating downward below the roots of plants and eventually reaching the aquifers.

An aquifer is an avenue, rather than just a stopping place for water. Because the ground water moves slowly, aquifers serve to regulate the stream flow. Over a span of months or years, the water that percolates into the aquifer is approximately balanced by the ground water that discharges into streams. This stream flow-stream to aquifer is part of the fresh water supply available to the new well site, located within the bounds of the Military Reservation. Therefore, careful land-use consideration and control must be exercised in future development of any of the watershed within the study area.



LEGEND



DECIDUOUS TREES: RED & WHITE OAKS PREDOMINATE. RED MAPLE, ALDER, BEECH, BIRCH, ASPEN & POPLAR OCCUR THROUGHOUT THE AREA.



SWAMP, MARSH LAND PLANTS: THE SWAMP, MARSH IN THE SOUTH CENTRAL PART OF THE STUDY AREA HAS CLASSIC SPRUCE BOG VEGETATION: SPRUCE TREES, BLUEBERRY BUSHES WITH SOME BIRCH AND MAPLE.



EVERGREEN TREES: WHITE PINE PREDOMINATE WITH SOME PITCH PINE AND HEMLOCK. SOME SPRUCE HAS BEEN INTRODUCED.



VEGETATION

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0 100 200 400 600

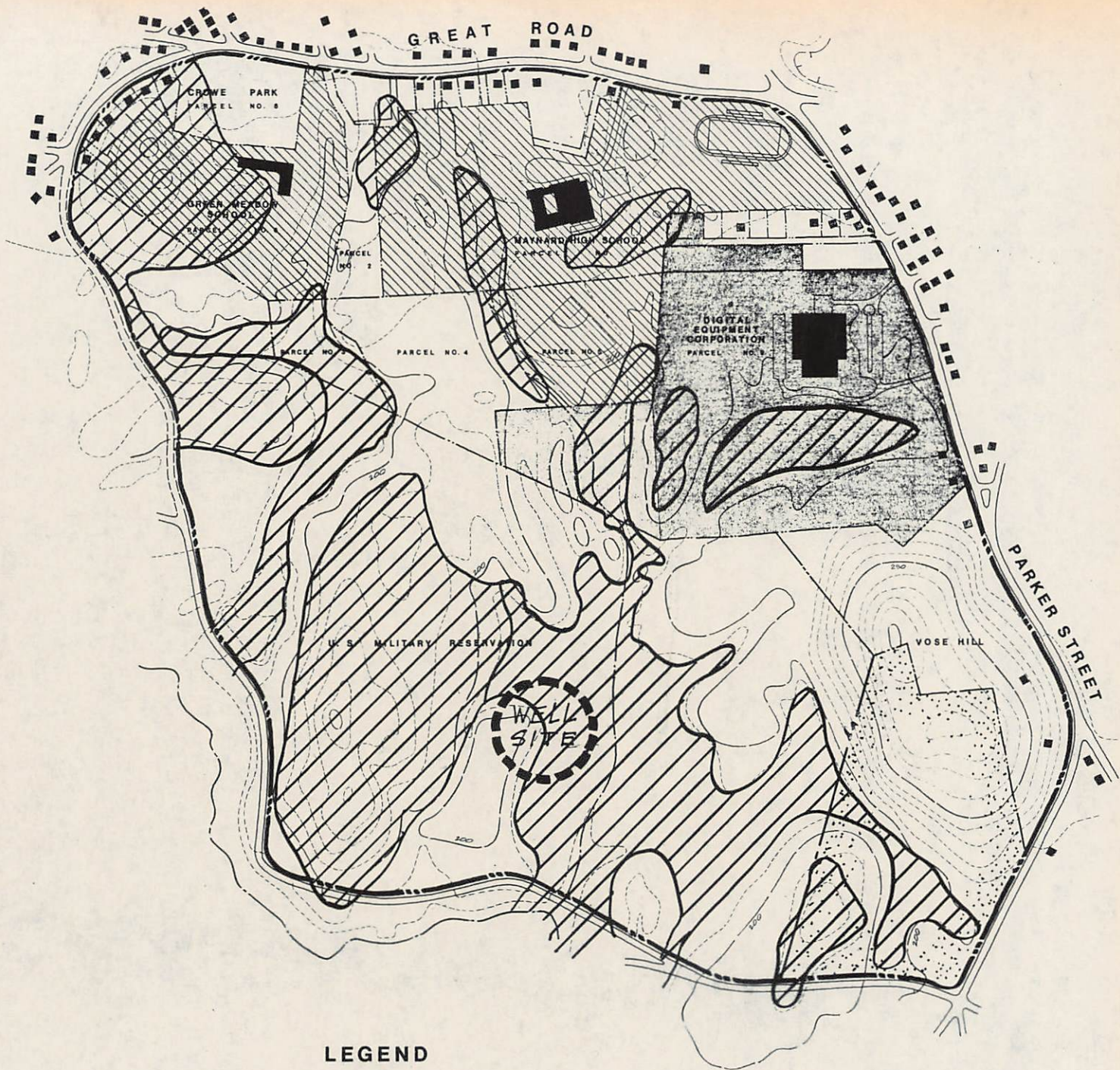
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VEGETATION:

There are three noticeable vegetation communities within the study area- that of Oak, White Pine and the Wetlands. Much of the area is secondary growth forest, less than 100 year old growth. A large variety of Oaks dominate much of the wooded area, interspersed with Red and Swamp Maples, Beech, Alders, Birches and Aspen, and in a lesser quantity, White Pine. Large size White Pines, in a small stand, are located in the swamp area, south of the Green Meadow Elementary School. A much larger stand of White Pine is found in the wooded area of Vose Hill, just west of Parker Road. A small quantity of Pitch pine is located at the southwest corner of the study area. This plant is indicative of the sand deposit that it grows on. This deposit is part of the aquifer-interface re-charge area.

The swamp-marshland located at the south-central portion of the study area, is a classic example of a Pine-Spruce-Blueberry Bog. The vegetation is that of tall young White Pines, Spruce trees that are tall and spindly, High bush blueberry, Cat-tails, Reeds and other typical wetland-swamp flowering plants. Some Birch and Maples have intruded into the bog, which is typical of wetlands in growth change. In the several other areas, there is an abundance of wildflowers typical of wetlands, located throughout the wetlands of the study area. Many of these wild-flower plants, located in the very wet areas, only grow in such high wet conditions, which makes them unique.



LAND USE

AN OPEN SPACE STUDY

PHASE I -- A PORTION OF THE TAYLOR BROOK WATERSHED
MAYNARD MASSACHUSETTS

DATE: MAY 1972
SCALE: 1" = 200'
0 100 200 300 400 500 600

PREPARED FOR:
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PREPARED BY:
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LINCOLN MASSACHUSETTS

PRESENT LAND USE:

The study area basically is divided into four major land-use areas; 1) the two schools and their adjoining lands, 2) the Digital Equipment Corporation, 3) the government held lands, and 4) the two recreational parks as well as residential areas on the periphery of the study area. A commercial area is adjacent to the Green Meadow Elementary School

The area for the schools is adequate even with some expansion and the addition of a Junior High School. However, a good portion of the land is questionable for development because of probable difficulty with outcrop material and the wetlands.

The Green Meadow Elementary School parcels, exclusive of Crowe Park, has 22.9+ acres. 14± acres is ground moraine with evidence of ledge or outcrop material.

The High School area (parcel 7) includes 46.7± acres. Approximately 4± acres is ground moraine with evidence of ledge or outcrop material. 5± acres is swamp or wetlands and 2± acres is taken up in the sink hole area.

The present baseball field (parcel 5) has 12.5± acres about 1± acre of which is swamp or wetland.

The area (parcels 1 and 2) between the two schools is about 5 acres in size. However, approximately 2 acres is either in wetland or is a "borrow" area. Crowe Park has about 7 acres of land.

In summary, the school property, with Crowe Park and parcels #1 and #2 and dropping the baseball field area (parcel #5) is approximately 82 acres. However, much of this land is expensive to

build upon. Approximately 28 acres of the 82 acres is questionable and the town should therefore carefully examine this area for further expansion of the school facilities.

The 28 acres of questionable land however has great value in its present state because of the environmental education potential as originally discussed in Mr. Raymond Gehling's letter of October 17, 1969.

SUMMARY AND CONCLUSIONS:

The Town of Maynard is a small town landwise, consisting of a land area of 5.24 square miles (3,360 acres), with one of the highest population densities in the Commonwealth of Massachusetts- approximately 1700 people per square mile. As such, it must protect and through careful planning, control and manage its resources in order to meet present and future needs of the community.

One of the most valuable and important resources of any community is the Open Space areas. Therefore, it is essential that the people of the Town of Maynard consider the best possible use of their remaining vacant or open lands. Future development of the study area must be carefully considered and all possible alternatives examined.

If the study area remains as public open space, it will meet the future recreation and educational needs of the community for many years to come. It would be an excellent site for future expansion of the school system. The open areas that are adjacent to the schools will provide space for outdoor classrooms that can be utilized for Environmental Education as well as all the other subjects taught at either of the two schools. With the advent of the twelve-month school, as a means of solving crowded classrooms and school enrichment programs, the outdoor areas will siphon off large groups of students in the summer. This being an alternative to utilizing a hot classroom in the summer, or perhaps the need

to air conditioning.

If the area of study is utilized for developmental purposes, such as light industry, housing or other, very specific controls and restrictions should be enforced in order to protect the water recharge areas and the quality of the water therein. Chemical pollution poses a constant threat. Salt that is carried from the highway on the under-sides of automobiles, as well as lead and other chemicals that are liberated from the exhausts of autos will dissolve in the water that falls on the parking lots, eventually finding their way into the water bearing aquifers.

Control must be exercised in the possible threat to changing the geological character of any land that is developed., in order that the absorption and storage character of the sand-gravel deposits not be altered. Additionally, surface-water runoff must be carefully controlled or damage will occur to vegetation and the water table. Great care must be exercised in order to prevent any threat to the aquifer intergange area at Taylor Brook, as this will directly affect the quality of the well drawn water. Land-use management for aquifers is more difficult than for many other areas, because constant consideration and control must be given to the quality and quantity of the water resource.

If and when the United States Government land becomes available to the Town of Maynard the multipurpose use of the area has to be carefully planned to provide for 1) recreation and open space, 2) protection of the town well, and 3) education usage. Limited land development, for industrial use could perhaps occur

in other areas of the Military Reservation, but would be rather remote within the study area because of the difficulty and costly site conditions, as shown on the land use plan.

What ever type of activity will occur within the study area, consideration must be given to the following points:

- 1) Development must in no way affect the quality of the water as well as the quantity that is required by the town.
- 2) Strict controls should be enforced to safeguard the area from surface or sub-surface pollution.
- 3) Development of the land must not alter the character of the sand and gravel deposits utilized as water storage areas,
- 4) If the Town of Maynard continues to utilize this area as open space, it will greatly meet the present and future needs of its residence for recreation and education.
- 5) If the area is utilized for industrail usage, strict controls must be inforced regarding the land use and pollution of the watershed.

The Town of Maynard must then weight the value of the study area as one to be developed for industrial or housing, or the continued use as open and recreation land.



THE COMMONWEALTH OF MASSACHUSETTS

WATER RESOURCES COMMISSION

LEVERETT SALTONSTALL BUILDING, GOVERNMENT CENTER

100 CAMBRIDGE STREET, BOSTON 02202

OFFICE OF THE DIRECTOR
DIVISION OF WATER RESOURCES

May 9, 1972

Harry F. Chapell, Chairman
Maynard Conservation Commission
41 Old Marlboro Road
Maynard, Massachusetts 01754

Re: Taylor Brook Watershed
Effect of proposed developments
on groundwater aquifer

Dear Mr. Chapell:

As a result of your recent request to the Massachusetts Water Resources Commission we requested the United States Geological Survey to conduct an informal review of the Taylor Brook Watershed in respect to the proposed development of the area and possible effects on the recharge of the test wells and the aquifer.

It is to be understood that this was an informal review only and not an intensive and complete geologic investigation. The following comments are the result of this review.

Resume of situation

Test drilling had located a source of ground water for the town of Maynard from an aquifer to the south of town center just west of a south-flowing tributary of Taylor Brook.

Proposals have been made by the Digital Corporation to enlarge their local facilities by construction of new buildings and parking lots in the headwaters of the tributary of Taylor Brook.

The question has been raised whether the proposed developments will have an adverse effect on the ground-water resource at the site of the test wells.

Features of the aquifer at the site of the test wells

The aquifer penetrated by the test wells is a body of sand and gravel of glacial origin along the west side of the minor valley. The aquifer is bordered on the west by an unnamed hill composed of glacial hardpan and underlying bedrock. Swampy lowland, such as that to the east of the test wells, is commonly underlain by fine-grained sand which does not conduct water nearly as well as sand and gravel, and such material probably forms a semi-permeable boundary on the east. The aquifer may extend a few hundred feet north of the northern test well and certainly extends southward under the west-flowing reach of Taylor Brook and toward Puffer Pond.

This aquifer is separate from the other deposits of water-bearing sand and gravel that occur to the east and to the north. Any hydraulic connection that may exist between these aquifers is probably so poor that they should be considered as separate.

The natural recharge to the tested aquifer comes from precipitation on the aquifer itself, some runoff from the hill to the west, and some of the precipitation on the swamp to the east. The water of Taylor Brook is a potential source of recharge. Sufficient pumping from this aquifer would eventually cause a cone of water-level drawdown to spread to the south-flowing tributary of Taylor Brook and to the reach of Taylor Brook to the south of the wells. Under these circumstances water from Taylor Brook would enter the ground to recharge the aquifer and to move toward the wells. The highly permeable portion of the aquifer extends to the north rather than to the east, and therefore infiltration is to be expected from the reach of Taylor Brook south of the test wells rather than from the tributary on the east.

Conclusions

It is believed that the proposed developments will have no significant effect on recharge to the aquifer located by the test drilling.

The aquifer at the test site is separate from aquifers to the east or north, and building on or near these aquifers will not effect the recharge from precipitation on or near the tested aquifer.

Building to the north might slightly reduce recharge to underlying aquifers, thereby causing a little decrease in summer low flow of the south-flowing tributary. However, the most recent plans by the Digital Corporation, according to Mr. Harry Chapell, Chairman of the Maynard Conservation Commission, include diking of certain low ground in and near the developments, in order to restrain any storm runoff that their developments might cause, and permit the water to infiltrate locally.

Any small decrease in local infiltration and summer flow that might possibly occur would have negligible effect on recharge to the aquifer tested. Recharge from infiltration is to be expected mainly from the west-flowing reach of Taylor Brook, not from the tributary. The flow of Taylor Brook

May 9, 1972

comes mostly from the southern tributary which drains Puffer Pond and the unnamed pond to the east and surrounding areas; the lesser part comes from the tributary from the north.

Any further developments in the drainage area of Taylor Brook will add a little more of the pollution that usually results from development, whether from fertilizer applied to lawns or salt applied to paved surfaces. However, any water of Taylor Brook that enters the tested aquifer will be filtered free of sediment and bacterial contamination in moving through the hundreds of feet of sand between the stream and the nearest well.

I hope this information will be useful to your Commission and the Town of Maynard. Please advise if we can be of any further service.

Very truly yours,

Charles F. Kennedy
Director and Chief Engineer

CFK/m