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DEPARTMENT OF THE INTERIOR
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for study

Possibilities of obtaining an additional water supply near Hingham, Massachusetts.

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In February 1942 the War Production Board requested the U. S. Geological Survey to furnish information on the possibilities of obtaining additional water supply near the shore at Hingham, Mass. It was estimated that 300,000 to 500,000 gallons a day was needed.

On February 25 and 26, 1942, a brief field study of the ground-water conditions was made in an area about 2 miles wide along the shore of Hingham Bay at Hingham, Mass. Most of this area is shown on the topographic map of the Weymouth Quadrangle, Mass., surveyed by the U. S. Geological Survey in 1936. The field work of the ground-water study consisted mainly of surface traverses and the examination of road cuts and gravel pits. In addition, well records and other data were collected from well drillers and public officials. Acknowledgment is made to H. B. Kinnison, district engineer, U. S. Geological Survey, at Boston, Mass., for his assistance and suggestions.

Hingham is about 15 miles southeast of Boston, Mass., and is bounded on the north by Hingham Bay, a part of inner Boston Bay. The town is situated in a coastal lowland region that has been extensively glaciated. The area is hilly and is characterized by marshes, ponds, and steep-sided elongate hills. The elevation of the land surface ranges from sea level to about

150 feet above sea level. The deposits consist of glacial drift and postglacial marine silt and muck lying on a floor of consolidated Paleozoic rocks. The surface of the bedrock is uneven and ranges in elevation from somewhat below sea level to about 80 feet above sea level. The bedrock crops out at the surface at many places in the eastern part of the covered area, but no outcrops of bedrock were observed in the westernmost part of the area.

The deposits of glacial drift range in composition from well-stratified outwash sand and gravel to unstratified glacial till. In general, extensive deposits of stratified glacial material occur only in the western part of the coastal area at Hingham, in the area west of Beal and New Bridge Streets. This is approximately the area occupied by the U. S. Naval Reservation. The upper surface of the drift is uneven, consisting of a series of irregularly grouped narrow hills and flat plains. At many places the deposits extend from somewhat below the level of Weymouth Back River—a tidewater river—to elevations as much as 60 feet above sea level. The depth to which the deposits of drift extend below the level of Weymouth Back River is not known. The stratified drift appears to be mainly highly permeable sand, gravel, and boulders. At many places the land surface is sandy, the soil cover being relatively thin. In the lower parts of the area the stratified drift is covered with postglacial marsh deposits of silt and muck. The glacial drift in the eastern part of the coastal area consists mainly of unstratified deposits of more or less clayey sand, gravel, and boulders (till) having a relatively low permeability. Although a few large elliptically shaped hills (drumlins) occur, the unstratified drift is relatively thin throughout most of the eastern area.

Small quantities of ground water can doubtless be obtained from the glacial drift and bedrock in most of the coastal area at Hingham, but relatively large quantities probably occur only in the stratified drift in the western part of the area. The available information indicates that at present only small quantities of ground water are pumped from the stratified drift. So far as is known, the largest ground-water development is at the U. S. Naval Reservation, where there are two groups of wells. One group of wells is about 500 feet west of the intersection of Beal Street and the New York, New Haven, and Hartford R. R. This group consists of five driven wells, 2 inches in diameter and about 25 feet deep, with a combined yield of about 50 gallons per minute. The wells are in a circle about 30 feet apart. The other group, located about 1,500 feet west of the first group, consists of two driven wells, 4 inches in diameter and about 30 feet deep, with a combined yield of about 100 gallons per minute. Both groups of wells are pumped by suction and obtain water from beds of sand and gravel that lie about at sea level. The wells in the first group became dry during the summer of 1941, a drought year, but the 4-inch wells furnished water during this period. It is reported that the 2-inch wells had never been dry prior to 1941. According to reports, the water obtained from the wells at the Naval Reservation is fresh, but it is used only for fire protection and boiler purposes.

It is believed that 300,000 to 500,000 gallons of water a day can be obtained from the stratified drift east and south of Weymouth Back River if a considerable number of wells are properly located, constructed, and operated. However, a ground-water development of this size should not be undertaken unless a large tract of land is available to provide for adequate spacing of

wells. The character of the stratified drift varies considerably within short distances, and test holes should therefore be drilled and pumping tests made in order to locate the best water-bearing deposits and to provide a basis for determining the proper type and construction of wells. The stratified drift lies below sea level at many places and probably extends under Weymouth Back River. Because of this, wells should be located at a considerable distance from bodies of salt water in order to prevent it from being drawn into the water-bearing beds. Furthermore, the wells and pumping equipment should be designed and operated so as to produce a relatively small drawdown when pumping, and thus minimize the danger of salt-water encroachment.

According to Samuel Kellam, Chief Engineer of the Boston Metropolitan Water District, their distribution mains in Quincy, Mass., are about 2 to 3 miles west of Weymouth Back River. The existing mains are capable of passing an additional 500,000 gallons of water a day, and the capacity of the supply system is sufficient to furnish that amount of water. However, before it would be possible to furnish this water it would be necessary to construct a high-level surface reservoir in order to prevent large fluctuations of pressure in the distribution mains. Mr. Kellam stated that the necessary distribution mains and reservoir could probably be installed in a relatively short time. He could not estimate the cost of the mains and reservoir but believed that his organization would bear a part of the expense of the reservoir because it would become a part of their system.