DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
COMMONWEALTH OF MASSACHUSETTS WATER RESOURCES COMMISSION
BOSTON, MASSACHUSETTS

HYDROLOGIC INVESTIGATIONS
ATLAS HA-504 (SHEET 2 OF 2)

EXPLANATION

A few gallons per minute from dug wells in compact boulderey silty gravel (till); for yield of wells finished in underlying bedrock, see accompanying text. Yields of wells in beach and tidal-marsh deposits not estimated

Yield of wells finished in stratified unconsolidated deposits above the compact boulderey silty gravel (till) is based on estimated transmissivity[1] of aquifer, assuming proper well construction at a site located by exploratory test drilling. Local variations in hydraulic conductivity and saturated thickness which determine the transmissivity may result in yields higher than those predicted in some areas and lower in others

0–100 gallons per minute (transmissivity 0–1,350 ft²/day)

100–300 gallons per minute (transmissivity 1,350–4000 ft²/day)

More than 300 gallons per minute (transmissivity more than 4,000 ft²/day)

Public surface-water supply pumped directly from pond or reservoir, pumped to large-diameter dug raw-water well, or supplemented by water pumped from drilled wells. Letters refer to those in table; location on map is that of pumping station

Public ground-water supply. Number refers to that in table

Observation well, water level records given in graph

Gaging station and number

Low-flow partial-record station and number

Well and station numbers are those used to identify wells, gaging stations, and low-flow partial-record stations in national network of hydrologic data-collection sites of U.S. Geological Survey (1965-72)

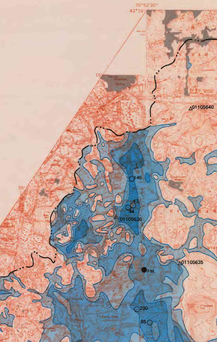
Transmissivity is the rate at which water of the prevailing kinematic viscosity is transmitted through a unit width of the aquifer under a unit hydraulic gradient. (Lohman and others, 1972, p. 13).

Basin boundary

PUBLIC WATER-SUPPLY SYSTEMS

Town, city, or corporate water system and well or pumping station name	Map symbol	Capacity of pumping station (mgd)	Pumpage 1970 (mgd)	Remarks and notes
ABINGTON-ROCKLAND JOINT WATER BOARD			885	Supplies Abington and Rockland
Great Sandy Bottom Pond station	GSB	3.0	311	Pumps from pond and infiltration gallery on NW shore of pond
Fox's Pit well	78	.08		
Dyer's Pit reservoir	88	.72		Not yet in service
BROCKTON			3,361	
Silver Lake sta. (Pembroke)	SL	16-18	3,361	Supplemented by diversion from Montgomery Pond (in Taunton R. basin) and Furnace and Oldham Ponds
COHASSET			240	
Beechwood Station (Lily Pond)	LP	.86		Lily Pond pumped to raw water well at station
Elms Meadow well(s)	2	.28		Exhausts storage rapidly
Jerusa D. wells	6, 7	.17		Exhausts storage rapidly
DUXBURY			325	
Depot St. well	1	.5		
Partridge Rd. well	2	.35		
Powder Point well and gravel-packed well	14	1.0		
Tremont St. wells	26, 27	1.1		
Lakeshore Drive well	72	.72		
HALIFAX				No public supplies in area
HANOVER			330	
Pond St. Station, Pretoria well	3	1.1		Pond St. Station on standby pending construction of treatment facilities for high iron, manganese, color
Pond St. Station temporary 8-inch well	4	.43		
Hanover St. wells	5, 8	.72		
Broadway wells	4A,A2	.55		
HANSON			185	Supplied by Brockton system
HINGHAM WATER COMPANY			1,131	Supplies Hingham, Hull, and North Cohasset
Falling Mill Station dug well	FM	2.2	716	Supplemented by diversion from Accord Pond and artificial recharge of aquifer from Accord Brook
Free St. well 2	42	2.0	61	
Free St. well 3	44	1.0	177	
Scotland St. well	41	.5	163	
Scotland St. well	43	.5	11	
Prospect St. well	100	.5	——	Under construction 1971
KINGSTON			278	
Soule's Pond gravel-packed well	8	.73		
Soule's Pond wellfield	10	.32		Standby supply
Main St. well	11	.73		
Westbrook St. well	120	.72		
MARSHFIELD			660	
School St. well	19	.5		To be connected 1972
St. Helga wells	21	.32		
Pleasant St. well 1	25	.36		Used summer only
Pleasant St. well 2	27	.36		Used summer only
Furnace Brook well 2	28	1.0		
Furnace Brook well 3	29	1.0		
Furnace Brook well 5	39	.43		
Furnace Brook well 6	37	.72		
South River Dr. well	100	.5		To be connected 1972
NORWELL (All stations 8- or 12-inch naturally developed wells)			198	
Grove St. well 2	1	.27		
Grove St. well 3	2	.18		
Grove St. well 4	3	.54		
Well east of Jacob St.	64	.76		Not connected to system
High St. well 4, Grassy Swamp	80	.40		
High St. well	81	.20		
Rowley St. well	82	.09		
Rowley St. well 5	83	.43		
PEMBROKE			220	
Hobomock St. well 1	41	.76		
Center St. well 2	260	1.0		
Well 3	101	.63		
PLYMOUTH				No public supplies in area
PLYMPTON				No public waste supply
SCITUATE			570	
Old Oaken Bucket Pond Sta.	SB	.75		Pumps from pond, which is supplied by water released from reservoir upstream; expandable to 2 mgd.
Kent St. well 2	4	.2		High chlorides used in summer only
Webster Meadow well 10	10	.13		
Webster Meadow well 11	11	.15		Emergency supply only
Gannett St. well 13	12	.18		High iron, high color
Old Oaken Bucket well 17	17	.5		High iron, high color
Boston Sand & Gravel well 18a	18	.24		High chloride when pumped continuously
Edison well 19	29	.5		
Filter well 20	93	.22		High iron and color, unused
Barnes well 22	95	.36		
WEYMOUTH				No public supplies in area

* All wells not otherwise indicated are 12- or 16-inch gravel-packed wells; well fields are 12-inch wells manifolded together.



SEASONAL AND ANNUAL FLUCTUATIONS IN GROUND-WATER STORAGE ARE REFLECTED BY CHANGES OF THE WATER TABLE. — *Seasonal declines in water level are caused by addition of water to storage during the winter recharge season and discharge of water from storage during the growing season, which evapotranspiration from soil moisture generally prevents recharge to the aquifer.*

WATER FROM BEDROCK

Granitic and altered sedimentary and volcanic rocks provide a secondary aquifer that is nearly everywhere adequate to supply household needs. The yield of 133 bedrock wells ranges from one half to 125 gpm (gallons per minute); the average yield is 13 gpm, the median yield is 6 gpm. The yield of 81 of these wells is less than 15 gpm, and five of the eight wells yielding 60 gpm or more are industrial supplies. Most bedrock wells penetrate only a few tens of feet of bedrock before they fully. Depth of 253 wells ranges from 32 to 1,010 feet and averages 187 feet. Wells for which records are available are largely in the granitic rocks in Norwell, and are not numerous enough elsewhere to distinguish significant differences in yield between granitic rocks and the sedimentary and volcanic rocks. Quality of water is generally unknown, but has proved satisfactory for domestic use, with the exception of one 595-foot deep well in Norwell which had a chloride concentration of 1,125 mg/l (milligrams per liter), more than four times the recommended limits of U.S. Public Health Service (1962). Other problems are reported to be excessive iron and manganese, and corrosive properties.

MAP SHOWING AVAILABILITY OF GROUND WATER IN UNCONSOLIDATED DEPOSITS

SCALE 1:48,000
MILES
KILOMETERS
CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER
SHORELINE SHOWN HAS MEAN RANGE OF TIDE 9.8 FEET

MAP SHOWING SURFICIAL DEPOSITS AND SATURATED THICKNESS

DESCRIPTION AND WATER-BEARING CHARACTERISTICS OF UNCONSOLIDATED DEPOSITS

Line of equal estimated saturated thickness of stratified, unconsolidated deposits, in feet. Shows only in areas that are not mantled by compact or sandy till

Description of materials extending from water table to bedrock and estimated hydraulic conductivity[1], in feet per day (in parentheses). To convert hydraulic conductivity to coefficient of permeability[2], in gallons per day per square foot, multiply by 7.5.	Topographic expression, surface runoff, and infiltration capacity	Water table	Exploration for ground water
Well-sorted gravel (more than 100) and fine to coarse sand (40-150); locally boulderey at base of headlands formed of silty boulder gravel (till). Generally marine stratified silt, sand, gravel, tidal marsh deposits, till, and bedrock (in northern part of area).	Forms beaches, bars, and spits having little surface runoff and high infiltration capacity.	Generally within 10 feet of surface.	Water in beach deposits provides small supplies of fresh to brackish water commonly having more than 500 mg/l dissolved solids. Chances for obtaining adequate supplies from wells poor. Salinity increased by salt-water inflow during high storm tides. Drilling easy for light rigs except on boulder beaches.
Tidal peat, organic silt, silt (less than 10) and fine to medium sand (90-100), commonly less than 20 ft thick. Generally marine silt, sand, gravel, and compact silty boulderey gravel (till).	Flat tidal marshes inundated at high tide or during storm tides. Infiltration capacity poor.	Near or above surface.	Water generally contains more than 500 mg/l dissolved solids, except for the North River marshes upstream from Rte 3A, where water probably has less than 500 mg/l dissolved solids. Drilling generally easy for light rigs, except for isolated boulders and boulders in underlying deposits.
Dominantly silt and clay (less than 20) lying beneath relatively thin topset and foreset deltaic sand and gravel (40-120) in Duxbury, Pembroke, and in smaller deltas elsewhere; lies beneath thin mantle of fine sand (40) in Marshfield, Scituate, and Norwell, and thin sand and gravel (40-120) where unit adjoins those of sand and gravel. Commonly rests directly on compact silty boulder gravel (till).	Flat to gently sloping, locally pitted deltas and flat to gently undulating lake bottoms. Surface runoff rapid to very rapid. Infiltration capacity high to moderate over surface sand and gravel of deltas, moderate to low over sand mantle of former lake bottoms.	At or deep as 10 feet in higher parts of some deltas, but within 10 feet of surface in low-lying lake bottoms.	Predominance of fine-grained deposits limits production of water; locally, where the silt and clay lie above sand and gravel, large-yielding wells may be developed. Drilling generally easy for light rigs.
Dominantly fine to coarse sand (40-120) and some thin beds and lenses of fine gravel (120-200) and silt (less than 10), chiefly fine-grained outwash deposits and topset and foreset beds of deltas. Sandy outwash commonly overlies compact silty boulder gravel (till) (less than 10); deltaic sand commonly lies above silt and clay (less than 10). Texture of deposits becomes finer-grained southward in individual areas.	Flat to gently sloping, locally irregular, deltas and kame fields (outwash), and outwash plains. Surface runoff low. Infiltration capacity high.	As deep as 80 feet in some areas, not commonly more than 10 or 12 feet of surface.	Generally yields large supplies of water where saturated thickness is greater than 40 feet. Drilling easy for light rigs. Coarser parts yield most water. Deposits also found at northern margin of fault.
Dominantly fine to coarse gravel (130-475) and some beds of sand (40-120) and silt (less than 10). Gravel deposits include topset beds of deltas and outwash, in which the texture becomes finer-grained southward. Deltaic gravel and some kame field deposits generally lie above sand and silt; some kame field deposits and outwash deposits generally lie on compact silty boulder gravel (till) (less than 10).	Flat to gently sloping, locally irregular, deltas and kame fields (outwash), and outwash plains. Surface runoff low. Infiltration capacity high.	As deep as 75 feet in higher parts of deltas and in Kingston and of some deltas, but generally within 10 or 15 feet of surface in outwash plains.	Generally yields large supplies of water where saturated thickness is greater than 50 feet. Drilling generally easy for light rigs, except in unusually coarse gravel or in boulderey deposits.
Chiefly loose, unstratified, unsorted sandy, silty gravel (sandy till) (less than 100), poorly stratified and poorly sorted coarse sandy boulder gravel, and some well-sorted gravel and sand (100-475) and silt (less than 10). Texture and hydraulic conductivity highly variable horizontally and vertically. Thickness unknown from subsurface data.	Deep pits and high ridges of Manomet Hill and moraine at southern border of area. Gentle slopes and flats of subdued to moderate undrained depressions. Infiltration capacity high.	As deep as 90 feet on higher ridges, but near land surface in some depressions and near ponds and basins.	Extent of deposits having high hydraulic conductivity largely unmeasured by drilling. Productive wells may be developed locally at favorable topographic positions, and should be tested by heavy drilling equipment capable of penetrating the numerous large boulders. Probable use of light rigs impractical.
Till overlying unstratified stratified deposits Till overlying stratified sand Till overlying stratified sand and gravel Compact silty boulder gravel (compact till) (less than 10) or loose silty sandy boulder gravel (sandy till) (less than 100) overlying stratified sandy gravel (120-250), sand (40-50), silt and clay (less than 10) as indicated by few test holes and exposures in pits, quarries, and sea cliffs, or locally on bedrock. Stratified deposits are unstratified/mixed where subsurface data are lacking and where their presence is inferred.	Undulating ground moraine on both bedrock and till hills. Surface runoff rapid to very rapid and low to moderate in sandy till. Infiltration capacity low in compact till to moderate in sandy till.	As deep as 90 feet on hills, but near land surface in low-lying areas near shores, ponds, and the sea.	Estimates of yield from deposits beneath till are based on hydrologic properties of sand, gravel, and till as indicated by appearance of aquifer tests and subsurface data. Although till may be penetrated by light drilling rigs in some areas, the generally numerous large boulders make use of heavy drilling equipment worthwhile. Reflection seismic work has proved valuable in locating buried channels in till in combination with 6-inch test holes.
Compact reworked silty boulder gravel (till) (less than 10). May include small beds and lenses of poorly sorted stratified gravel, sand, silt, and clay in some areas, mantled with relatively thin deposits of gravel, sand, and silt. Less immediately above bedrock in most areas; in much of northern part of area bedrock is exposed.	Forms smooth domed drumlin shaped (or plan) hills and low, rolling boulderstrewn ground moraine on bedrock hills and in valleys. Surface runoff is low. Infiltration capacity low.	As deep as 90 feet on hilltops, but near land surface in low-lying areas near streams, ponds, and the sea.	Source of water from shallow dug wells used for domestic supplies. Some yield adequate supplies from wells finished in underlying bedrock. Drilling difficult for light rigs; most wells in bedrock drilled by cable-tool or rotary machines.

[1] Hydraulic conductivity is the volume of water at existing kinematic viscosity that will move in unit time under a unit hydraulic gradient through a unit area measured at right angles to the direction of flow. If a porous medium is isotropic and the fluid is homogeneous (Lohman and others 1972, p. 4).

[2] Coefficient of permeability is the rate of flow of water in gallons per day through a cross sectional area of 1 square foot under a hydraulic gradient of 100 percent at a temperature of 15.6 °C (60° F) (Wenzel, 1942, p. 7).

INDEX TO 1:24,000 U.S. GEOLOGICAL SURVEY TOPOGRAPHIC MAPS AND TO GEOLOGIC MAPS AND REPORTS USED IN COMPILING MAP

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WATER RESOURCES OF THE COASTAL DRAINAGE BASINS OF SOUTHEASTERN MASSACHUSETTS, WEIR RIVER, HINGHAM, TO JONES RIVER, KINGSTON

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