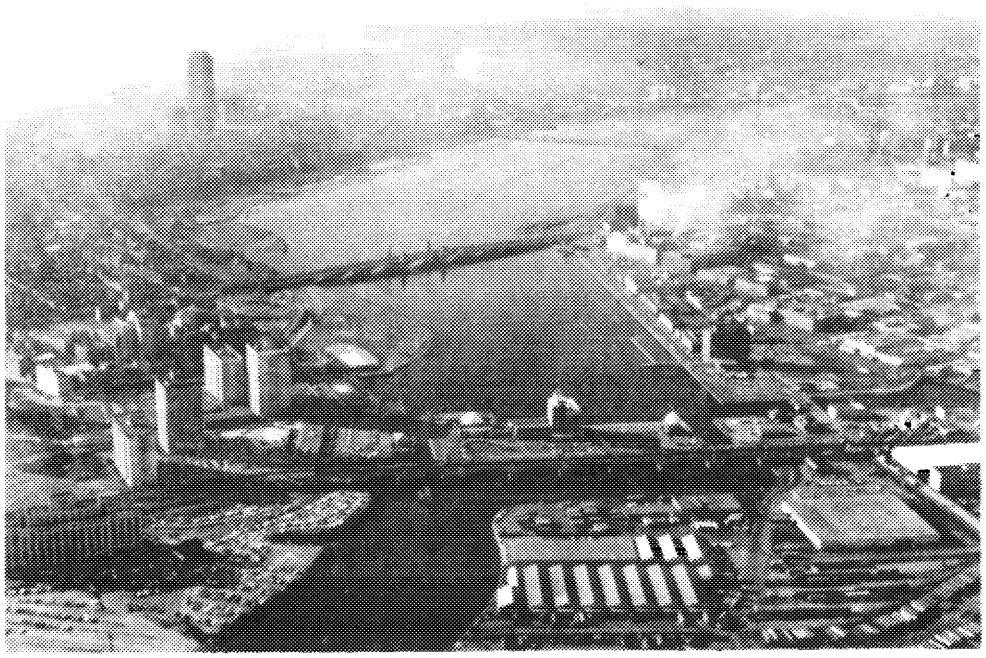
COMPREHENSIVE WATER AND RELATED
LAND RESOURCES INVESTIGATION

CHARLES RIVER WATERSHED

INFORMATION PAMPHLET

for

JANUARY 1967 HEARINGS



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

JANUARY 1967

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MASSACHUSETTS

1. INTRODUCTION

This pamphlet contains general information and sets out the general procedures being followed in developing a comprehensive plan for water and related land resources for the Charles River Watershed.* Orientation, direction, and coordination are indicated as well as the interrelationships and missions among the participants in the study.

2. AUTHORITY FOR STUDY

RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE HOUSE OF REPRESENTATIVES, UNITED STATES, ADOPTED 24 JUNE 1965.

> "That the Board of Engineers for Rivers and Harbors is hereby requested to review the report on Land and Water Resources of the New England-New York Region printed in Senate Document Numbered 14, 85th Congress, First Session, with particular reference to the Charles River Basin and tributaries, Massachusetts, with a view to determining the advisability of improvements in the interest of flood control, water supply, recreation, water quality control, navigation, tidal flood control, allied purposes and related land resources."

*An impoundment formed by the Charles River dam located near the mouth of the river is known locally as the Charles River Basin. To avoid confusion, the entire area draining to the Charles River will be referred to throughout the remainder of this pamphlet as the "Charles River Watershed."

3. STUDY OBJECTIVE

The basic objective of the Charles River Watershed study is the formulation of a plan of development which will serve as a guide for the best use, or combination of uses, of water and related land resources in the watershed to meet foreseeable short and long-term needs. To this end, consideration will be given to meeting present and future requirements for water supply, flood control, navigation, water quality control, recreation, fish and wildlife, and other purposes requiring development of water and related land resources. The investigations will emphasize formulation of a detailed plan to meet these needs through 1980 and indicate potentials to meet the needs through 2020. The plan will include components to supplement existing and currently planned developments so as to meet the 1980 needs of the basin. Measures capable of meeting longer term requirements will be incorporated in the plan.

4. WATERSHED DESCRIPTION

The Charles River watershed is located in eastern Massachusetts bordering on the watersheds of the Mystic, Merrimack, Blackstone, Taunton and Neponset Rivers and includes all or portions of 5 cities and 30 towns. The Watershed is about 300 square miles, including an important and highly developed portion of Metropolitan Boston and less developed but rapidly growing suburban and rural areas.

The 35 cities and towns wholly or partially within the watershed study area are as follows:

1. Ashland (2)
2. Arlington (2)
3. Bellingham
4. Belmont
5. Boston (3)
6. Brookline (1)
7. Cambridge (3)
8. Dedham
9. Dover
10. Foxboro (2)
11. Franklin
12. Holliston
13. Hopedale (2)
14. Hopkinton
15. Lexington
16. Lincoln
17. Medfield
18. Medway (1)
19. Mendon (2)
20. Milford
21. Millis (1)
22. Natick
23. Needham (1)
24. Newton (1) (3)
25. Norfolk (1)
26. Sherborn
27. Somerville (3)
28. Walpole (2)
29. Waltham (1) (3)
30. Watertown
31. Wayland (2)
32. Wellesley (1)
33. Weston
34. Westwood
35. Wrentham

(1) Wholly in watershed; (2) Only small portio of town in Watershed; (3) City government

The basin is hour-glass in shape with a length in a southwest-northeast direction of 31 miles and widths of 15, 6 and 15 miles in a northwest-southeast direction. Elevations vary from 586 feet, mean sea level, along the southwesterly rim of the basin in Hopkinton to below 10 feet, msl, along the lower $8\frac{1}{2}$ miles of the Charles River.

The estimated 1965 watershed population is 826,000. About 75% of this total is in the cities of Boston, Cambridge, Somerville, Newton and Waltham and the towns of Brookline and Watertown, all located in the lower portion of the watershed. In the ten-year period 1955-1965, there has been a small decline in total population within these six communities whereas the other communities in the watershed have generally experienced rapid growth and development.

Precipitation as both rain and snow averages 44.4 inches of water per year within a range of 43 to 47 inches. Runoff in the upper 80 percent of the watershed averages 22 inches. The runoff from the lower 20 percent which is highly urbanized is considerably higher, and it is estimated that 89 percent of the flood peaks in the Charles River Basin originate within this lower watershed area.

5. CURRENT STATUS OF WATER AND RELATED LAND RESOURCES IN THE BASIN

a. Navigation. Until about 1910, the $8\frac{1}{2}$ mile reach of the Charles River from the mouth at Boston Harbor to a dam at Watertown was tidal with a range of tide of 9.5 feet. The completion of the Charles River Dam in 1910 with navigation lock and sluice gates converted this reach to a fresh water basin with a fixed level of 2.4 feet above msl. For many years the lock has been adequate for decreasing commercial navigation and the increasing recreational boating. Doubt now exists of the ability of lock to handle present and anticipated future boat traffic efficiently.

Navigation in the river above Watertown Dam is restricted to shallow draft pleasure boats such as canoes, kayaks, and shallow draft outboard motor boats. The Watertown Dam, now being rebuilt, and the many upstream dams lack facilities to lift boats from level to level. Natural channels are narrow and shoal and there are numerous obstacles, such as rocks and trees.

b. Flood Control. Increased urban development in the Watershed has created flood problems. The situation is particularly acute in the Charles River Basin area between the Charles River Dam and the Watertown Dam. Urbanization has increased the rapidity and volume of runoff and encroachment by highway and other improvements since 1910 has reduced the storage capacity of the impoundment by elimination of extensive swamp which bordered the original impoundment.

The existing Charles River dam completed in 1910 separating the river from the tidal water of Boston Harbor has provisions for gravity sluicing of the river flow. The tide level is above Basin level for one-third of the time during normal tides and for one-half of the time during storm tides. Gravity discharge is impossible at those times. The Basin water surface elevation is then determined by the storm inflow. The Metropolitan District Commission has designed its new dam with pumps to discharge flood runoff to Boston Harbor.

The Metropolitan District Commission has altered the spillways of the Moody Street and Silk Mill dams and improved a section of channel upstream of the Silk Mill Dam in the interest of flood control. The Commission has also constructed an adjustable control gate at Mother Brook and improved a section of Mother Brook Channel which empties into the Neponset River. The Commission is authorized to lengthen the Cordingly Dam spillway and to improve other sections of the Charles River Channel.

The Waterways Division, Massachusetts Department of Public Works, has completed a short section of channel improvement and is completing a conduit enclosing the Charles River in the town of Milford.

c. Pollution. Municipal and industrial wastes in various stages of treatment are emptied into the stream throughout most of its length. Pollution has been particularly severe in the lower 25 miles where overloaded MDC intercepting sewers formerly relieved raw sewage into the river. MDC improvements costing over $110,000,000 were placed in operation in 1966 to eliminate this source of pollution. During periods of heavy rainfall, combined sewers in the older municipalities discharge to the river and tributary streams.

During periods of extreme low flow in the river, the MDC has provided as much as 15 million gallons of water per day from its reservoir at Lake Cochituate to increase flow and partially relieve pollution in the river.

d. Water Supply. The principal source of water for the Boston Metropolitan District is from outside the Charles River Watershed. The Metropolitan District Commission supplies water to 11 of the cities and towns in the Watershed with about 60 percent of the population of the watershed. The principal source of supply is the Quabbin Reservoir located some 50 miles west of the watershed.

The City of Cambridge and the towns of Lincoln and Milford obtain water from surface sources within the watershed. The Cambridge supply is supplemented by MDC. Dedham and Wellesley are supplied from dug, gravel packed and tubular wells fed from the Charles River. Needham receives about 50% of its supply from MDC, the remainder from wells within the town. The remaining towns derive their domestic water supplies from local ground water sources.

e. Recreation. The original concepts of the Charles River Basin Commission early in this century included the maximum utilization of the Basin and shoreline for park and recreation purposes. As a consequence, most of the basin shoreline and significant portions of river banks along the lower 10 miles of the river are now in Metropolitan District ownership. Development and use of this property has generally followed recreational demand.

The possibilities of recreational development along the Charles and in areas related to the Charles and its tributaries throughout the Watershed are almost unlimited and much needed for the great recent suburban growth in the area. There are opportunities for all forms of active and passive recreation. The principal obstacles include poor water quality, low flow conditions and urban development of potential recreation sites. Public acquisition, improvement, maintenance and proper planning of recreation areas has not kept pace with population shifts and growth.

6. DESIRES OF LOCAL INTERESTS

Determination of the desires of local interests and indication of means for resolving of conflicts will be an important part of the investigation. The numerous state and local governmental agencies and local groups in the watershed have expressed desires which in part include:

a. Review of the flood problem in the Basin and in the Muddy River and other critical areas.

b. Review of solution for the Basin flood and navigation problem proposed by the Metropolitan District Commission. A report prepared for the Commission recommends a new dam downstream of the existing 1910 Charles River dam with more adequate locks and sluice gates and a pumping station. Consideration of this and other proposals involves

other proposed developments such as the Inner Belt Highway and Massachusetts Bay Transit Authority construction.

c. Consideration of means to prevent encroachment on the flood plains and other areas adjacent to the Charles River and its tributaries upstream of the Watertown dam. Continued filling of natural storage areas and high intensity land utilization without adequate provision for open areas could lead to economic and aesthetic losses in the near future.

d. Consideration of multiple purpose storage in the headwaters for recreation, flood control and low flow augmentation.

e. Conservation of open spaces throughout the watershed and increased recreational development. The desires and needs for industrial and commercial expansion, highway construction and housing development are not known at this time. These important factors and their effects on runoff, water demands, and pollution will be given careful consideration in the study.

Public hearings scheduled for January 17th, 19th and 24th, 1967 will provide all interests an opportunity express their desires.

7. COORDINATION

The Division Engineer, New England Division, Corps of Engineers, has been assigned the major responsibility for the accomplishment of the study. Assistance and guidance is afforded by the Coordinating Committee comprised of representatives of each of the participating Federal agencies and representatives designated by the Governor of Massachusetts. The Division Engineer, as Chairman, will direct the Committee's periodic review of the progress of the study. Committee functions include the following:

a. Offer guidance.

b. Apprise the heads of Federal agencies and of State and local agencies of the progress and the trends of the studies.

c. Resolve differences or indicate available means for resolving differences, possibly outside the Committee.

d. Assist in coordinating efforts of participants, and

e. Aid in presenting to the public the results of the coordinated comprehensive planning effort.

Members of the Coordinating Committee are listed below:

Chairman - Division Engineer
New England Division, Corps of Engineers
Colonel Remi O. Renier

Membership

Commonwealth of Massachusetts

Robert L. Yasi, Department of Natural Resources
Howard J. Whitmore, Metropolitan District Commission

Federal

Karl R. Klingelhofer, Department of Agriculture
Edwin W. Webber, Department of Commerce
Walter M. Newman, Department of the Interior
Albert V. Soukop, Department of Health, Education & Welfare
Frank C. Batstone, Department of Housing & Urban Development

In addition to the Coordinating Committee, a "Citizen's Advisory Committee" will be formed of officials and residents of the municipalities in the watershed representing many and diverse interests. The Committee will provide valuable information on specific desires, problems and conflicts which exist in the watershed.

8. PARTICIPATION OF AGENCIES

Federal agencies will participate in varying degrees with the Corps of Engineers in the study. Several agencies of the State assist in the investigations by providing available data from State studies, and advice to the participating Federal agencies. Contacts between the Federal and State agencies will be facilitated by the Coordinating Committee. The needs and desires of the state in the development of water resources are being ascertained through the Coordinating Committee which also is utilized to consolidate and reconcile participant's views.

MERRIMACK RIVER BASIN (SHAWSHEEN)

MYSTIC RIVER BASIN

CHARLES RIVER WATERSHED

BOSTON

ATLANTIC OCEAN

WORCESTER

NEPONSET RIVER WATERSHED

MASSACHUSETTS

BROCKTON

WOONSOCKET

RHODE ISLAND

ATTLEBORO

TAUNTON

PROVIDENCE

VICINITY MAP

SCALE IN MILES

10 0 10

CANADA

MAINE

BANGOR

AUGUSTA

MONTPELIER

VERMONT

NEW HAMPSHIRE

CONCORD

CHARLES RIVER WATERSHED

MASS.

WORCESTER

BOSTON

HARTFORD

PROVIDENCE

CONN. R.

ATLANTIC OCEAN

LOCATION MAP

SCALE IN MILES

25 0 25 50 75 100

MERRIMACK RIVER (SUDBURY-CONCORD)

CHARLES RIVER BASIN

LEXINGTON

LINCOLN

ARLINGTON

BELMONT

CHARLESTOWN

SOMERVILLE

CAMBRIDGE

CHARLES R. DAM

CHARLES RIVER BASIN

WALTHAM

WATERTOWN

MOODY ST. DAM

WATERTOWN DAM

MIDDLESEX TURNPIKE

ROLLING STONE (REMIS) DAM

BLEACHERY DAM

WESTON

WAYLAND

NEWTON

BROOKLINE

BOSTON

WEST NEWTON

AUBURNDALE

Chestnut Hill Res.

Jamaica Pond

FOREST HILLS

Weston Res.

Crystal Lake

NEWTON LOWER FALLS DAM

CORDINGLEY DAM

METROPOLITAN CIRCULAR DAM

SILK MILL DAM

WELLESLEY

NEEDHAM

BOSTON

WEST ROXBURY

DEDHAM ISLAND

MOTHER BROOK CONTROL STRUCT.

COCHRANE DAM (CHARLES R. VILLAGE)

SO. NATICK DAM

DEDHAM

NATICK

FRAMINGHAM

WESTWOOD

DOVER

SHERBORN

ASHLAND

HOPKINTON

HOLLISTON

MEDFIELD

MILLIS

WALPOLE

NEPONSET RIVER

ECHO LAKE DAM

MILFORD WATERWORKS DAM

DILLA ST. DAM

CEDAR SWAMP POND DAM

MEDWAY

WEST MEDWAY DAM

MEDWAY DAM

MILFORD

CARYVILLE DAM

FRANKLIN

NORFOLK

FOXBORO

BELLINGHAM

NO. BELLINGHAM DAM

BOX POND DAM

HOPEDALE

MENDON

WRENTHAM

BLACKSTONE RIVER BASIN

TAUNTON RIVER BASIN

US 493

LEGEND

EXISTING DAMS

CHARLES RIVER WATERSHED

CHARLES RIVER, MASSACHUSETTS

SCALE IN MILES

1 0 1 2 3

JANUARY 1967

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

HOPKINTON | MILFORD | HOPEDALE | MENDON | BELLINGHAM | MEDWAY | FRANKLIN | NORFOLK | MILLIS | MEDFIELD | SHERBORN | NATICK | WELLESLEY | DOVER | NEEDHAM | WESTWOOD | DEDHAM | BOSTON | NEEDHAM | NEWTON | WELLESLEY | WESTON | WALTHAM | NEWTON | WATERTOWN | WALTHAM | WATERTOWN | NEWTON | BOSTON | CAMBRIDGE

ECHO LAKE DAM
CREST EL. 353.6

PROPOSED RT. 495

MAIN ST. BRIDGE

HARTFORD AVE. BRIDGE

DEPOT ST. BRIDGE

PROPOSED RT. 495

MILFORD W.W. DAM
CREST EL. 296.1

DILLA ST. DAM CREST EL. 273.4

CEDAR SWAMP POND DAM
CREST EL. 269

NO. MAIN ST. BRIDGE

BOX POND DAM
CREST EL. 221.8

SANFORD ST. BRIDGE

NO. BELLINGHAM DAM
CREST EL. 200.9

CAREYVILLE DAM
CREST EL. 187.2

PLEASANT ST. BRIDGE

WEST MEDWAY DAM CREST EL. 169.7

MEDWAY DAM
CREST EL. 159.3

MAIN ST. BRIDGE

FARM ROAD BRIDGE

SO. NATICK DAM
CREST EL. 110.5

RT. 128 BRIDGES

COCHRANE DAM
CREST EL. 101.3

BRIDGE ST. BRIDGE

MOTHER BROOK
CONTROL STRUCTURE
CREST EL. 85.2

KENDRICK ST. BRIDGE

RT. 128 BRIDGE

SILK MILL DAM
CREST EL. 84.0

MET. CIRCLE DAM
CREST EL. 70.4

CORDINGLEY DAM
CREST EL. 58.3

MOODY ST. BRIDGE

NEWTON LOWER FALLS DAM
CREST. EL. 42.2

MOODY ST. DAM CREST EL. 35.5

BLEACHERY DAM CREST EL. 20.6

ROLLING STONE DAM CREST EL.15.7

WATERTOWN DAM CREST EL. 8.6

CHARLES RIVER DAM

CHARLES RIVER BASIN
NORMAL POOL EL. 2.38

GALEN ST. BRIDGE

B.U. BRIDGE

HARVARD BRIDGE

CHARLES RIVER ℄ PROFILE

80 76 72 68 64 60 56 52 48 44 40 36 32 28 24 20 16 12 8 4 0

RIVER MILES ABOVE MOUTH

SCALES: Hor. 1" = 2 Miles
Vert. 1" = 20 Feet