

N. W. F.

REPORT

OF THE

CITY ENGINEER

RELATIVE TO THE

PROPOSED DEVELOPMENT

OF THE

Asnebumskit Water Supply

*In City Council
July 9-1906-*

To the City Council of the City of Worcester :

On December 29, 1904, the following order was adopted by the City Council:—

“Ordered: That the City Engineer be, and he is hereby authorized and requested, under the direction of the Mayor, to proceed at once to make surveys, plans, specifications and estimates of the cost of construction for aqueducts, canals, dams and reservoirs for the full development of the Asnebumskit water shed, so-called, as named and described in chapter 351 of the Acts of 1902, and report as soon as possible to the City Council.”

In accordance with the above order, I have the honor to herewith submit the following REPORT:

That portion of the Asnebumskit water shed which has been looked upon with contemplation as a future water supply for the city of Worcester, has upon further investigation and survey presented many additional features that are favorable to its consideration, and has confirmed the good impression which a somewhat limited search had previously formed.

The physical characteristics of the entire area are very attractive for the intended purpose, being for the most part of a wild nature, with a very small percentage of tillable land, and with sparse habitations throughout its borders. Not the least desirable feature is its nearness to the present Tatnuck Brook supply, its separation being formed only by a low and short divide, which permits the system of reservoirs to be almost continuous. The fact that its run-off is available by gravitation, and that nature has done so much to minimize the difficulties of its obtaining, makes the project appear almost ideal.

In extent the watershed comprises about 9.48 square miles, and includes portions of the towns of Holden, Paxton and Rutland. The shed is naturally subdivided in two parts, that lying nearest to

the Tatnuck Brook comprises about 1.80 square miles, and includes a small pond known as Kendall reservoir. The waters of this portion of the shed flow northerly and join the waters of the main stream at Eagle Lake. Its basin is a fairly generous one and offers opportunity for an initial development, being sufficient for the impounding of its own waters and a part of the main stream, which can discharge into it by means of a canal. The principal part of the shed on the main brook itself has two points that offer practicable locations for the main dam and reservoir, but the more suitable one of the two I believe to be at the site of the present dam and basin, known as the Pine Hill reservoir. This location offers superior advantages for the construction of a dam and reservoir by reason of the comparatively short dam required, and the excellent basin there existing. The underlying bed rock is at favorable depths, and the materials for construction conveniently located and from a careful examination of the surroundings I believe this site the more desirable one to consider.

It may be asked 'Why not build one large dam and reservoir for conserving all the water?' Attention was given to such a project, but sufficient basin capacity at the Kendall reservoir site does not exist, and a dam at that point is necessary in order to utilize the adjoining shed to advantage. By reason of this detached area from the main stream, it is more convenient and practicable to impound the waters separately, and to place the main dam for the larger portion of the shed at a more suitable location, where the basin necessary to its proper conservation can be found.

Thorough surveys of the several locations for the proposed works have been made, and many borings to determine the nature of the underlying strata obtained, and in each instance favorable conditions were encountered for carrying out the work as here recommended. After a careful study and consideration of all the facts, I believe the dam and reservoir at Kendall Pond should be first considered, and I

recommend the construction of an impounding reservoir upon this site, with dam of sufficient height to flow to elevation 814.00. As recommended, this reservoir will have an area of one hundred seventy-one and eighty-two hundredths 171.82 acres, and a length of one and forty-five hundredths 1.45 miles. Its available capacity will approximate eight hundred fourteen million gallons, and its maximum depth will be thirty-two (32) feet. The level of the water will be a few feet above the summit of the Tatnuck Brook divide, and a dyke at this point will become necessary. A gate house for the control of the water is a feature of the dyke, from which a concrete conduit forty-eight (48) inches in diameter will deliver the water into a discharging pool immediately before its union with Tatnuck Brook.

This point is about one-fourth mile above the Tatnuck Brook reservoir No. 1. The main dam will be situated at the northerly end of the reservoir, with a waste weir thirty-five (35) feet in length discharging into Eagle Lake. The dam will be eleven hundred feet in length, and should be provided with a valve chamber for emptying the reservoir when desired. The area to be flowed by the reservoir should be thoroughly cleared of all matter that may impair the quality of the water, so that the present high standard of supply may be maintained. It is also recommended that the waters of Asnebumskit Brook be diverted by head works situated upon the stream, the flow line of the diverting dam to be at elevation 822.00. An overfall dam at this point will be required, with suitable bulkhead, sluice gates and other appurtenances for its proper control. From the head works a canal some two thousand seven hundred feet in length will convey the water to the Kendall reservoir to be discharged in thin vein by a weir running parallel with the canal, by which means abrasion and wash may be avoided. It is recommended that the primary dam at Pine Hill be constructed to flow to elevation 902.00, which will give a reservoir capacity of about two thousand millions of gallons, and an area of two hundred

ninety nine acres. The maximum depth of water at the dam will be fifty-five (55) feet, and the waste weir will have a length of seventy-five (75) feet. ~~The will have a length of seventy-five (75) feet.~~ The water will be discharged through suitable appliances into the natural stream, and flow thence to the head works and canal for disposition.

Two designs for a dam at the Pine Hill location have been made, one an earthen structure and the other of cyclopean concrete. The locality is very favorable to the latter form of construction, and is well adapted to the site selected. Its cost also estimates somewhat less than the earthen dam, and from the nature of its foundations, and other features pertaining to its construction, I believe it is the preferable form to use.

The development of the Asnebumskit stream as herein recommended will make a decided addition to the present water supply, and with the increased storage previously recommended upon Tatnuck Brook, should amply supply a population twice that of the present.

The plan herewith presented does not require the completion of the entire project for some years to come, but can be built from time to time as circumstances demand. I believe, however, that the Kendall reservoir, together with the canal and head-works, should be constructed at once, in order that its storage and the run of the brook can be diverted into the present supply when occasion requires. By the building of the conduit, with the canal and their accessories, the waters of the main stream can be turned into Tatnuck Brook through the present Kendall Pond, but lacking the proposed storage would be greatly minimized in value when needed.

If, however, it should be thought wise to advance the work no faster than the revenue of the Water Department will permit, then I believe this course of procedure the best, to be followed by the building of the dam at Kendall reservoir.

With this work accomplished, the storage conditions will then be such that the raising of the

Tatnuck Brook dam Number 1, as proposed by a previous report, can with safety be carried out when deemed necessary, and the full value of that stream utilized. This form of procedure will defer the construction of the larger dam and reservoir at Pine Hill for many years, and make possible the storage needed to safely meet periods of diminished rainfall.

The generous storage facilities offered by the project herein recommended will greatly reduce the cost of the impounded water as compared with that of the present system, the reservoir cost of which, per million gallons stored, amounts to five hundred fifteen dollars (\$515.00,) whereas by the proposed project, its cost estimates four hundred dollars (\$400.00) per million gallons.

The estimate of cost in accordance with the terms of the within order of the City Council, are as follows:

Aqueduct to Tatnuck Brook with appurtenances,	\$86,511.00
Asnebumskit canal with Headworks,	\$62,002.00
Kendall dam and reservoir,	\$443,441.00
Pine Hill dam and reservoir,	\$534,504.00
Total,	\$1,126,458.00

Detail plans of the various features pertaining to the work have been prepared, and are on file in the office of the Engineering Department."

Respectfully submitted,

Frederick A. McClure,
City Engineer