

REPORT

OF

H. A. GRAY, Esq.,

CIVIL ENGINEER,

ON PROPOSED

WATER SUPPLY

FOR

DARTMOUTH, N. S.



HALIFAX, N. S.

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DARTMOUTH, N. S., 26th April, 1875.

W. S. SYMONDS, Esq.,

Warden, Dartmouth.

Dear Sir,—Relative to the water supply of the town of Dartmouth I have the honour to report:—After exploring all the Lakes in the vicinity I decide in favour of your obtaining your supply from Lamont and Topsail Lake. This Lake, having an area of 700 acres, would be capable of supplying the present population of Dartmouth at the rate of 30 gallons a day to each individual for the next 60 years, without counting upon any accession from springs or rain during that period. It would, therefore, be sufficient for a population of 60 times the present number. The elevation of the Lake over tide water is 224 feet. It would be brought by a 10 inch main pipe, 6 feet deep beneath the Preston Road, from the Lake to the city, a distance of 3 miles, and thence distributed by a 4 inch pipe through every street in the town, from Black Rock to the residence of J. W. Johnstone, Esq. 40 hydrants placed a distance of 1000 feet apart. These hydrants would be so constructed that water could be easily obtained for household purposes, and, at the same time, be made available for the use of the Fire Department. The whole could be completed at a cost of \$82,000.

From chemical tests I have made I find the water from Lamont and Topsail Lake is of a fine quality, clear and pleasant to the taste, and admirably suited for the purpose of cleansing, cooking, chemistry and manufacture. The most common impurities of water are salts of lime and iron, which injure it for all purposes except drinking—these impurities are found in a large measure in the water from the wells in the town—Albro's Lake, a distance of 2 miles from the town, at an elevation of 189 feet, contains much colouring matter of peat moss, which is a compound of carbon with oxygen and hydrogen, and unfits it for manufacturing purposes, and, to an extent, for drinking, as it produces an unpleasant flatness to the taste. Anderson's Lake contains the most pure water, but its distance—5 miles—from the

town, and the amount of excavation, nearly all in rock, to lay the main pipe, as well as not possessing so great a head of water as Lamont and Topsail, decides against it.

I deem it needless to descant upon the various investigations I have made, or to perplex you with calculations, and, therefore, have made my report as simple as possible so as to be easily comprehended by every citizen.

I have the honor to be, Sir,

Your obedient servant,

HENRY A. GRAY,

Civil Engineer.

DARTMOUTH, N. S., 27th April, 1875.

W. S. SYMONDS, Esq.,

Warden of Dartmouth.

Dear Sir.—Acting upon your instructions with reference to a less expensive mode of supplying water for the immediate necessities of the town, than that contained in my previous report—I have this day examined Oat Hill Lake, and beg to submit the following:—The elevation of this Lake, over tide water, is 160 feet, and could be raised by artificial means to a higher level; it has an area of 7 acres, and would be capable of supplying the present population of Dartmouth, at the rate of 30 gals. a day to each individual, for 100 days, without any accession from springs or rain. From information I can obtain, I think it would be able to keep up a constant supply, as the surrounding land is high and the lake fed chiefly by springs. Its distance from the town is about 1 mile. I would propose to bring the water by a 10 inch pipe from the lake to the harbour;—distributing it by a 4 inch pipe through all the streets running North and South in the town plot,—with Hydrants placed at the principal corners, for domestic and fire purposes. The cost would be as follows:

Total.....\$21,844.00

At any future date the system could be extended to Lamont's Lake, with merely the extra cost of 2 miles of main pipe.

I have the honor to be, Sir,

Your obedient servant,

HENRY A. GRAY,

Civil Engineer.

DARTMOUTH, N. S., 31st May, 1875.

GEO. J. TROOP, Esq.,

Warden, Dartmouth.

Dear Sir,—Acting upon your letter of instruction and the minute of Council annexed, dated May 21st, directing me to report in full upon the capabilities of Oat Hill Lake for a Water Supply for the Town of Dartmouth, and the cost of same, and further to report in regard to any other Lake where a supply of water can be obtained for the town, and the probable cost of same, I have the honour to reply :—

I have made a most careful instrumental examination of Oat Hill Lake and surrounding land, and find that in my former report, addressed to the late Warden, under date 27th April last, which report was drawn up at a few hours' notice, I did not specify, in consequence of the shortness of the time I had at my disposal, the full capabilities of this lake. I conclude, from my surveys, soundings and sections that it can be increased in area, by a dam, to nearly three times the size I then based my calculations upon. This increase would give a supply of 30 gallons a day to each individual in the present population (3000) for the whole year without any accession from springs, rain, &c., and with only a head of five feet. It is also possible to obtain, by a diversion of only 500 feet, and at a very small cost of labour, a stream of water running to the eastward of the lake, and having an elevation of over 15 feet above the lake's present surface, which will greatly augment the filling of the Lake and keeping up its head.

In event of this Lake being decided upon by the Council, it would be necessary to purchase the land skirting the lake—say about 30 acres in extent—part of which would be overflowed by the damming, and the rest should be reserved by the town to prevent its being used for the purposes of cultivation, grazing cattle or erection of buildings. I would also recommend the clearing and grubbing of part of this land ;—the water in the lake reduced, and the bed, for at least 50 feet from the present shore, cleaned and all vegetable or other deleterious matter removed. This could be done during the building of the dam, and much of the material cut down and the clay from the bed of the lake would be available for building the dam.

Referring to my Report of the 27th April the cost would be as follows:—

Pipes, Excavation and Hydrants, &c.,	\$21,844 00
Add to which—Dam 400 feet long, cleaning and lowering lake, clearing sides and puddling edges, pipe houses, &c.,	8,000 00
Purchase of lake property and area outside as recommended	3,000 00
Diversion of stream	1,000 00
Contingencies, Inspection, &c., &c.,	2,500 00
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	\$36,344 00

By bringing the water from Oat Hill Lake, the system could be extended, at any future date, to any of the series of Lakes lying at a further distance in the same direction—for the better understanding of which I have prepared the accompanying sketch plan of the Lake District in the vicinity of Dartmouth. You will observe that there is a large choice, with an unlimited area of water power; capable, by elevation and extent, for any high service or quantity that may ever be required at a future date for the town. I would strongly recommend to the Council the desirability of at once securing the right and title of one at least of these Lakes—either Topsail and Lamont's, Loon or Clifford's. The first would, I am informed, be expensive, as there are so many rights and prospective ones to be bought out, to do which would require probably a sum of not less than \$15,000. Loon Lake, with a large area of fine water, and only 1 mile to the East from the West of Lamont's Lake, and $4\frac{1}{2}$ from the town, could be obtained for a much less sum, and would be an excellent Lake to secure; as it is not only large in itself but has an extensive feeding ground. Clifford's Lake, on the top of Break-heart Hill, on the Cole Harbour Road, and only a distance of $3\frac{1}{2}$ miles from the town, has an elevation of over 300 feet above the harbour, which is some 80 feet above any other Lake in the vicinity of the town. This Lake strongly recommends itself from its height, purity and area, and the very small cost at which it can be obtained, viz: the whole right with offer of all material for dam and right of way to road has been made for the sum of \$400. I would strongly recommend to the Council the great advantage of at once bringing the supply from this Lake. Its elevation would admit of a much smaller main, pipe and thus reduce the weight, and consequently, the cost—a 6 inch pipe would be ample. It would not only give a present supply, but would

be sufficient for many years to come. The cost would not exceed \$58,000 complete, and without the necessity of resorting to any artificial means. In comparison with the other proposed supply, the advantage of this Lake, would, I am sure, warrant the Council making the additional outlay ; giving, as it would, to the town a permanent, reliable and unstinted daily necessity.

I do not deem it necessary to give the cost of constructing a water system, at present, to any of the other Lakes named above. It is unnecessary to do so as the amount granted by the town would not be sufficient without greatly increasing the sum—this you will readily understand by referring to my report on Lamont and Topsail Lake, dated 26th April :—and also from the fact that the present requirements, and for many years to come, can be obtained with only a small additional sum.

My attention was called to Albro's Lake, lying to the north of the Town. This Lake contains a large body of water, and is only $1\frac{3}{4}$ miles from the Town. It is, however, very shallow at the west end, and would require a dam to be constructed at this point, of not less than from 700 to 900 feet long, which of itself would be an expensive operation. Its elevation is only 189 feet above the harbor, which is not sufficient for supplying the elevated portions of the town. It is not possible to extend the system at a future date to any extent in the direction of Albro's Lake, as the Lakes further on would be, after daming Albro's, at a lower elevation. It would be necessary to lay the pipes from the Lake to the town plot through private property, instead of along the public road, as contemplated from the other Lakes, thus increasing the cost of construction to a large extent, especially as the excavation and service road required here, near the present natural run of the stream from the Lake, would be entirely through a country of rock and boulders. There are some very valuable rights to the water running from this Lake, and annexed to this Report is a letter from the principal one—the owners of the Dartmouth Rope Walk—which I would call your attention to. The cost of construction and purchase of property—(not including the Rope Walk, as I can get no estimate upon this)—could the Lake and property be obtained, would be not less than \$75,000,00.

I deem it prudent to impress upon yourself and the council the necessity of immediate action—if this work, fraught as it is, with

future welfare and safety of the town—is to be carried out. A better time for the purchase of materials, especially pipes, may not occur again for many years, as the iron market is now at a very low figure. With a judicious amount of energy it is quite possible to have the whole work completed and ready, for fire and domestic use, at every corner in the town plot, and along the whole line of main pipe, by November next. I would, therefore, strongly recommend the council to place themselves in such a position that they may receive tenders for the work without any delay.

I cannot close my Report without tendering my thanks and appreciation to the gentlemen of the committee from the council, appointed to assist me. From Dr. Weeks I have received much valuable information which has helped me to direct my conclusions, and from the other gentlemen every attention and information.

I have the honor to be, Sir,

Your obedient servant,

HENRY A. GRAY,

Civil Engineer.

With Report.

1. Sketch plan of Lake District.
2. Letter from Rope Walk Company.
3. Mr. Bell's Letter—Clifford's Lake.
4. Former Reports—on water supply.

The following are the distances from Dartmouth ferry, elevation and area of the Lakes on the plan which accompanies the Report: Maynard's, distance 1 mile, elevation 163.70 ft.; Oat Hill, distance $1\frac{1}{8}$ mile, elevation 147.30 ft., area 9 acres—can be increased to 18; Penhorn, distance $1\frac{1}{2}$ miles, elevation 168.68 ft., area 13 acres; Clifford's, distance $3\frac{1}{2}$ miles, elevation 304.78 ft., area 30 acres; Lamont's and Topsail, distance $3\frac{1}{2}$ miles, elevation 222.40 ft.; Loon, distance $4\frac{1}{2}$ miles, elevation 220.32 ft., area 300 acres; Albro's, distance $1\frac{1}{2}$ miles, elevation 189 ft.

HALIFAX, 27th May, 1875.

Sir,—Respecting Albro's Lake, and the water from them, we would respectfully say,—That it was the water supply coming from these Lakes through the property we use, that led us to place our works where they are.

The Water supply for such works is most important, in several ways, for Steam Engine, for washing material, and for protection from fire.

The water from these Lakes in the Summer season is scarcely sufficient for our wants, as it is we have to make a reservoir to retain during the night what may be used in the day.

If the Town of Dartmouth was to draw off this water for its use, our works could not be kept a going. The purchase of the South-end of the Lake, and the land surrounding it was made by us at considerable cost for the express purpose of being able to have a control of the water.

As the volume of water is not sufficiently abundant to give a supply to the Town of Dartmouth and to our use also, we have therefore very respectfully to ask the Council to abandon the idea of taking the water from Albro's Lakes.

Respectfully yours,

W. J. STAIRS,

And others—owners of Dartmouth Rope-walk.

To FRANCIS MUMFORD, Esq.,

And the Committee for Water Supply, Dartmouth.

DARTMOUTH, 27th May, 1875.

TO THE TOWN OF DARTMOUTH.

I will give all my right and title of Lake you want for watering Dartmouth, together with privilege of daming the water and all material for same, with a right of way twelve feet wide, for the sum of four hundred dollars (\$400,00.)

GEORGE BELL.