PRIVATE.

SOUTH STAFFORDSHIRE WATER WORKS COMPANY.

SECOND REPORT

OF THE

ENGINEER

AS TO

ADDITIONAL WATER SUPPLY,

WITH SPECIAL REFERENCE TO THE TAKING OVER OF SOME PORTION OF THE PRESENT WORKS OF THE BIRMINGHAM CORPORATION.

PARADISE STREET,
BIRMINGHAM,
25th May, 1899.

SOUTH STAFFORDSHIRE WATER WORKS COMPANY,
BIRMINGHAM.

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TO THE CHAIRMAN AND DIRECTORS OF THE SOUTH STAFFORDSHIRE WATER WORKS COMPANY.

SECOND REPORT OF THE ENGINEER AS TO ADDITIONAL WATER SUPPLY, WITH SPECIAL REFERENCE TO THE TAKING OVER OF SOME PORTION OF THE PRESENT WORKS OF THE BIRMINGHAM CORPORATION.

On the 26th ultimo, the Directors visited certain of the Birmingham Corporation Works, referred to in my previous Report dated March 28th, 1899, and at the request of the Chairman, I now beg to submit some further observations, with a view to assisting the Board to arrive at a definite conclusion in regard to their acquisition by this Company; and whilst doing so I have to remember that it has been decided to establish a new Pumping Station in the neighbourhood of Trent Valley Junction within the Company's area.

The establishment of this Station should, if the works are commenced at once, put the Company in the position of having in 1902 a surplus of 1,120,000 gallons per day, based upon an annual increased demand of 300,000 gallons per day, and also upon the realisation of the estimated increased supply from Kingswinford. As, however, the consumption at Burton is rapidly increasing, it would be wise to look upon this Station as being nothing more than a proper provision for the supply of the Burton district alone, although, in case of urgent necessity in the immediate future, it would be available temporarily for augmenting the general supply of the Lichfield system.

Relative desirability of the several Birmingham Works.

With a view to narrowing somewhat the field of enquiry, I proceed to eliminate such of the Birmingham Works as were put forward for consideration in my previous Report, but which now, in the light of further knowledge, and of the visit of the Directors, appear undesirable for acquisition.

There seemed to be a general consensus of opinion by the Board that the Shustoke and Whitacre Works might be dismissed from serious consideration, and for many reasons I am prepared to concur in this view. They are the furthest removed from our own district, and the mains alone would therefore be a costly item. The water of the Bourne, though good, is hard, and not of a very good colour; and moreover, the price to be paid for these works, forming as they do, a complete scheme, and from their geographical position more easily available to other authorities requiring water, would most probably be relatively greater than that of the pumping stations nearer Birmingham and to our own district.

There remain, therefore, for further consideration, the following works: Short Heath Pumping Station, Upper Witton Reservoir, Aston Wells Pumping Station, and Plants Brook Pumping Station and Reservoirs.

I recommend the acquisition of all these works should the Company be able to entertain them financially. If, however, it is found impracticable to take them all, and it becomes a question of choice as to which of these works should be taken over, I would place them in the following order of eligibility ; and, first of all, I would premise that, in any case, whichever of the pumping stations may be acquired, it will be necessary to have a site for a re-pumping station, and a reservoir from which to take the water for re-pumping. Seeing that the level of Upper Witton Reservoir is suitable both for pumping into from each of the three stations, and for pumping therefrom into Barr Beacon Reservoir, and that there is plenty of adjacent land suitable for a re-pumping station, everything points to the desirability of its acquisition.

ASTON WELLS PUMPING STATION.—This station is perhaps the best for the purposes of the Company. The yield of water of 2½ million gallons per day is the largest of the three stations, and the quality of the water is also better than that of the water of the other two stations, and it is, I consider, if only on account of it being a deep well water, the least likely to deteriorate. Again, the area of the land necessary to be taken will be smaller than in the other cases. It should therefore be relatively the cheapest to acquire. The station is, moreover, favourably situated on the canal side for the coal supply. The site is well isolated on all sides from the surrounding land, by the river Tame, the Tame Valley Canal, and the London and North Western Railway.

Upper Witton Reservoir is only 1½ miles distant, to connect up to which a new 18-in. main will be necessary. The estimated cost of the works required to connect this station to Upper Witton would be, as stated in my previous report, £4,250.

SHORT HEATH PUMPING STATION.—The quality of the water here is very good, but it will probably in the course of time, may be a very considerable period, deteriorate. This tendency to deteriorate, which is due, no doubt, to the extremely porous nature of the strata, and to the increasing population residing in the vicinity, is supported by comparing recent analyses of the water with some made several years ago.

There is a large quantity of land, something like fifty to sixty acres surrounding the station and the Upper Witton Reservoir, a large portion of which would have to be taken over with the station.

The question of cartage of slack should be borne in mind in considering this station, and the same would apply also to the re-pumping station if fixed at this place. On the other hand, of course, the extra value paid for land alongside a canal is often sufficient to neutralise the capital cost of cartage to a distance.

PLANTS BROOK PUMPING STATION AND RESERVOIRS.—The advantages of these works are, a large quantity of water combined with 33 million gallons storage. The quality of the water is good when filtered. The necessity for filtering the water is, to a certain extent, a disadvantage, but need in no way condemn the station should the Board otherwise think of entertaining it. The watershed of Plants Brook is within the Company's area of supply, and for the reasons stated in my

former report, it would, perhaps, be desirable that the Company should possess this station, although I do not wish to lay too much stress on this point.

The station is very favourably situated as regards coal supply, the Birmingham and Fazeley Canal running close alongside it. Of the three works, however, these would probably be most expensive to acquire, for not only are there the reservoirs but there is also a large area of land, about 53 acres, which would have to be taken over together with about 4½ miles of mains to the re-pumping station.

The principal determining factor in a choice of stations should undoubtedly be the quality of water, due regard being had also to the quantity, and in placing the works in order of preference, I have been chiefly influenced by these considerations. Other, and yet most important points, many of which have been already mentioned, such, for example, as convenience of access, availability of existing plant, outlay required for new works for connecting to re-pumping station, etc., would also, in the event of the question of choice being raised, have a large determining influence.

The situation and actual conditions of these stations certainly compare unfavourably with those of the pumping stations already possessed by the Company, and for this, of course, due allowance will have to be made when the works come to be valued, while deductions will also have to be made for forced sale, for future probable deterioration in quality, and also for the uneconomical plant.

On this latter point, I find that the consumption of slack compares unfavourably with that at the Company's stations; this, I understand, is principally due to the class of boilers in use. It will be necessary, I believe, to lay down new boilers at each of the the three stations, but any expenditure due to inefficiency, whether in engines or boilers, will be dealt with when the valuation of the plant comes to be made, and will be a matter for further consideration.

Financial Considerations.

In order to enable the Board to have some idea of the expenditure involved, I now give a summary of the estimated capital cost of proposed works :

BIRMINGHAM WATER WORKS.

A. If three Stations viz., Aston Wells, Short Heath, and Plants Brook, with a total daily average yield of 6·26 million gallons, were taken.

Estimated Cost of connecting the Stations to UPPER WITTON :

	£	£
Aston Wells	4,250	
Short Heath	nil	
Plants Brook	nil	4,250

	£	£
Brought forward		4,250
Estimated Cost of Re-pumping Station at UPPER WITTON :		
(1) With two engines, each to pump 3 million gallons per day, and necessary boilers (erected in the first instance)	46,805	
(2) With three engines, each to pump 3 million gallons per day, and full number of boilers ...	59,867	59,867
Estimated Cost of Mains from UPPER WITTON TO BARR BEACON AND WEST BROMWICH :		
27-in. main from Upper Witton to Queslett	17,000	17,000
24-in. main from Queslett to Barr Beacon	5,700	
24-in. main from Queslett to West Bromwich	14,300	20,000
Total ...		£101,117

B. If two stations, viz., Aston Wells and Short Heath, with a total daily average yield of 4·1 million gallons, were taken.

	£	£
Estimated Cost of connecting the Stations to UPPER WITTON :		
Aston Wells	4,250	
Short Heath	nil	4,250
Estimated Cost of Re-pumping Station at UPPER WITTON :		
With three engines, each to pump 2 million gallons per day, and necessary boilers	45,765	45,765
Estimated Cost of Mains from UPPER WITTON TO BARR BEACON AND WEST BROMWICH :		
24-in. main from Upper Witton to Queslett	13,300	13,300
24-in. main from Queslett to Barr Beacon	5,700	
24-in. main from Queslett to West Bromwich	14,300	20,000
Total ...		£83,315

WORKS IN S. S.W.W. DISTRICT.

BURTON.

	£	£
Estimated Cost of Pumping Station and a new 18-inch Main :		
Pumping station and connecting mains	32,400	
18-inch mains from Wichnor Bridges to Burton	18,600	51,000
SPRINGSMIRE.		
Estimated Cost of Re-pumping Station and necessary mains	15,000	15,000
KINGSWINFORD.		
Estimated Cost of New Works in progress	16,500	16,500
Total ...		£82,500

MEM.—The estimated cost of establishing a Pumping Station, with connecting mains in the Company's area, to pump one million gallons per day :

Pumping Station	£25,000	
Mains	£10,000	£35,000

If two only of the stations were taken over, Aston Wells and Short Heath, the estimate for the re-pumping station would thus be reduced by £14,102 (£59,867—£45,765), and the difference in the estimate for laying a 24-inch main which would be required instead of a 27-inch main, to the "Horns" at Queslett would be £3,700 (£17,000—£13,300) or a total reduction of £17,802 or about 23% on the cost of the re-pumping station and mains to Queslett. The average quantity of water to be re-pumped in this case would be reduced from 6·26 million gallons to 4·1 million gallons per day or by about 29%.

It would appear as if the expenditure on the proposed new pumping station and mains for Burton, and on the re-pumping station and mains at Springsmire, the estimated cost for which is £66,000, or including the new works at Kingswinford £82,500, would be met during the five years 1899, 1900, 1901, 1902, 1903, prior to any payment that would become due for the Birmingham Works, since the estimated average available expenditure on extraordinary capital at £17,213 per annum (vide p. 15 Interim Report) would be for the five years £17,213 × 5 or £86,065.

The payments for the Birmingham Works would, I assume, be spread over a number of years. Thus, for instance, if the payments were spread over a period of fifteen years, the sum available for the purchase of the Birmingham Works and connecting them to Upper Witton Re-pumping Station would be £17,213 × 15 or £258,202, less the amount to be expended for the re-pumping station and the mains to Barr Beacon and West Bromwich. Although it is only proposed to erect two engines and the necessary boilers in the first instance, the cost of the complete equipment of the re-pumping station with three engines and the additional boilers will have to be included in considering the question

of payment. This increases the estimate for the re-pumping station by £13,062, from £46,805 to £59,867, and the amount to be expended on the re-pumping station and the mains to Barr Beacon and West Bromwich would thus be £59,867 + £37,000, or £96,867. The sum available for the purchase of the Birmingham Works and connecting them to Upper Witton would therefore be £258,202 less £96,867, or £161,335.

If, however, the 24-inch main from Barr Beacon to Queslett and thence to West Bromwich were considered, as I think it might be, an ordinary extension, a sum of £20,000 would be released from the amount required under the head of extraordinary capital outlay, and the sum available would then be £258,202 less £76,867, or £181,335. This is equivalent to $\frac{£181,335}{6{\cdot}26}$ or £28,967 per million gallons per day obtained, and as the purchase price of the works and connecting mains may be taken at less than this figure, it appears to me that the Company would do well to entertain the taking over of the three stations, if satisfactory terms can be arranged.

If only Aston Wells and Short Heath were contemplated, there would be a further reduction of £17,802 to be made from the capital outlay required on the re-pumping station and the mains therefrom, and the sum available for the purchase of these works and connecting them to Upper Witton would then be £181,335 + £17,802, or £199,137, equivalent to $\frac{£199,137}{4{\cdot}1}$ or £48,570 per million gallons per day obtained.

By extending the period of payment to twenty years or making it in some way conditional upon the Company's revenue, the terms could be made very much easier.

Question of Procedure

I respectfully venture to submit that the course to pursue will be that some communication should pass between the Birmingham Corporation and the Company with regard to the proposed sale and purchase of either one or more of the three pumping stations in question.

The respective Engineers would have to arrive at a price, and terms would have to be agreed upon between the two parties. These negotiations will necessarily take a considerable time, and when complete will require parliamentary sanction.

This sanction may possibly have to be sought by both the Corporation and the Company. It is just possible that a provisional agreement could be come to in time for the next session of Parliament; if not, and we had to wait for the following session, *i.e.*, 1900-1901, we should not, I suppose, obtain the the Royal Assent before the middle of 1901. If, however, the necessary works for utilising the Birmingham Water had to be deferred till then, it would still be possible to complete the scheme by 1903.

In the meantime the 24-inch main from Barr Beacon to West Bromwich might be laid.

Whilst considering the question of Parliamentary Powers, I would suggest that a clause be agreed upon, by which the Corporation would be empowered to sell water to the Company from their Welsh Scheme.

H. ASHTON HILL, M. Inst., C.E.
Engineer.

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