( C O P Y )

SOUTH STAFFORDSHIRE WATER WORKS COMPANY.

April 1914.

FUTURE WATER SUPPLY.

Pursuant to the instructions of the Board at their Meeting in March last, that I should report on the margin of safety and the area in which I recommend the Directors to obtain further supplies of water, I beg to report as follows:-

MARGIN OF SAFETY:

In the first instance I give figures showing:

I. The yield of the various Pumping Stations.

II. The increased daily average consumption for 5, 10 and 15 years.

III. Comparative consumption for the years 1909 to 1913:

(a) Average daily consumption for the year,

(b) Average per day for 14 days maximum supply,

(c) Highest daily consumption.

IV. Estimated future requirements.

## YIELD OF PUMPING STATIONS.

| Name of Station. | Daily Yield. Million Gallons. |
|---|---|
| Lichfield, | 3·00 |
| Huntington, | ·46 |
| Moors Gorse, | 1·12 + |
| Fradley, | 1·02 |
| Shenstone, | 1·90 |
| Ashwood, | 3·00 |
| Bourne Vale, | 1·40 |
| Trent Valley | 2·00 |
| Hinksford, | 1·38 + |
| Brindley Bank, | ·85 |
| Pipe Hill, | 2·00 |
| Maple Brook, | 2·00 (Estimated) |
| | 20·13 |

## DAILY AVERAGE CONSUMPTION.

| Year. | Daily average consumption. | Increase. | Decrease. | Average daily Increase for 5 years. | Average daily Increase for 10 years. | Average daily Increase for 15 years. |
|---|---|---|---|---|---|---|
| 1898. | 8,970,044 | | | | | |
| 1899. | 9,764,299 | 794,185 | | | | |
| 1900. | 10,573,513 | 809,284 | | | | |
| 1901. | 10,806,411 | 232,898 | | | | |
| 1902 | 11,477,893 | 671,482 | | | | |
| 1903 | 12,207,782 | 729,889 | | 647,547 | | |
| 1904 | 12,280,417 | 72,635 | | | | |
| 1905 | 12,911,278 | 630,861 | | | | |
| 1906 | 13,424,602 | 513,324 | | | | |
| 1907 | 13,597,856 | 173,254 | | | | |
| 1908 | 13,896,337 | 298,481 | | 337,711 | 492,629 | |
| 1909 | 14,391,978 | 495,641 | | | | |
| 1910 | 14,617,586 | 225,608 | | | | |
| 1911 | 16, 082,239 | 1,464,653 | (Drought) | | | |
| 1912 | 16,319,053 | 236,814 | | | | |
| 1913 | 16,750,725 | 431,672 | | 570,877 | 454,294 | 518,712 |

## COMPARATIVE CONSUMPTION.

1. Average per day for each year.
2. Average per day for 14 days' maximum supply.
3. Highest daily consumption.

| Inclusive dates. | Average per day for each year. | Average per day for 14 days' maximum supply. | | Highest daily consumption. | |
|---|---|---|---|---|---|
| | Gallons. | Gallons. | Increase per cent over daily average for year. | Gallons. | Increase per cent over daily average for year. |
| 1909. May 11) to May 24) | 14,391,978 | 15,646,347 | 8·71 | 18,836,539 (May 22) | 30·88 |
| 1910. June 10) to June 23) | 14,617,586 | 16,145,073 | 10·44 | 18,359,046 (June 18) | 25·59 |
| 1911. July 19) to Aug. 1) | 16,082,239 | 18,598,991 | 15·64 | 21,385,201 (July 29) | 32·97 |
| 1912. Feb. 1) to Feb. 14) | 16,319,053 | 19,200,125 | 17·65 | 21,292,401 (Feb. 10) | 30·47 |
| 1913. May 23) to June 5) | 16,750,725 | 18,200,671 | 8·65 | 20,160,867 (Aug. 2) | 20·35 |

## ESTIMATED FUTURE REQUIREMENTS.

1. Daily average 1913, 16,750,725 gallons.
2. Average daily consumption during maximum fortnight 1913 (May 23 to June 5) 18,200,671 "
3. Highest day's consumption 1913(2nd Aug.) 20,160,867 "
4. Average daily increase for 15 years, 1898-1913, 518,712 "

Estimated consumption for next 15 years:-

| Year. | Calculated at an average daily increase of 500,000 gallons. | Calculated on the maximum fortnightly consumption - an increase of say 12% over average for year. |
|---|---|---|
| 1914. | 17,250,725 | 19,320,812 |
| 1915 | 17,750,725 | 19,880,812 |
| 1916 | 18,250,725 | 20,440,812 |
| 1917 | 18,750,725 | 21,000,812 |
| 1918 | 19,250,725 | 21,560,812 |
| 1919 | 19,750,725 | 22,120,812 |
| 1920 | 20,250,725 | 22,680,812 |
| 1921 | 20,750,725 | 23,240,812 |
| 1922 | 21,250,725 | 23,800,812 |
| 1923 | 21,750,725 | 24,360,812 |
| 1924 | 22,250,725 | 24,920,812 |
| 1925 | 22,750,725 | 25,480,812 |
| 1926 | 23,250,725 | 26,040,812 |
| 1927 | 23,750,725 | 26,600,812 |
| 1928 | 24,250,725 | 27,160,812 |

From these figures it will be seen that the average daily increase for 15 years (1898 to 1913) was 518,712 gallons and I calculate that if the consumption continues to increase at say 500,000 gallons per day, the estimated average daily consumption in seven years from now, i.e. 1921, will be 20·75 million gallons.

I would again emphasise the fact that in dealing with the capacity of Works it is eroneous to base calculations upon the daily average consumption, but that they should rather be based upon the average daily consumption during the period of the maximum fortnight, which in the year 1921 I estimate will be 23·24 million gallons.

In January 1913 when making my estimates for Parliament I prepared tables showing that with the addition to our existing resources, of Maple Brook and two new Pumping Stations of 1,000,000 gallons each, we should only be able to maintain a satisfactory supply during time of maximum demand until 1917, assuming that all the plant was available and there were no breakdowns.

If the Company had Maple Brook Pumping Station at work this year, they would scarcely possess sufficient Works to give the necessary margin of safety, as they would only have a surplus of 1 million gallons per day.

In connection with this subject I would remind the Board of the report I made on December 24th 1912 to the effect that we had been obliged to exceed the 3 million gallons per day at Ashwood.

I should also point out that during the greater part of the Quarter ending 31st March last we were obliged to pump from Ashwood much in excess of the Statutory quantity.

Should we have 3 or 4 weeks continuous dry weather during the coming Summer, I am afraid that even if we over-pumped at Ashwood and thereby came into conflict with the Seisdon Rural District Council, Shavers End Reservoir may at times run empty, and so affect the supply to parts of our District.

Another important consideration is the possibility of a series of bursts on trunk mains or breakdowns at the Pumping Stations, such as I reported in November 1911, when whilst we were engaged putting in a new Force Pump rod to one of the Engines at Shenstone, a well pump bucket of the other Engine jammed in the working barrel and it took 5 days to get the Engine at work again. During this period we had 3 serious bursts on trunk mains.

Again, the influence of frost has to be reckoned with sometimes, coupled with breakdowns. For example, in February 1912 I reported that as the result of a very severe frost some of the Company's Reservoirs actually ran dry, although the whole of the Engines were going at full speed and Ashwood was pumping at the rate of $3\frac{1}{2}$ millions per day. Water Carts had to be employed to give a very restricted supply to the Dudley and Sedgley Districts. Before we had properly recovered after the frost we had a second total stoppage at Shenstone and had to instal a temporary Pumping Engine - these emergency supplies are always costly.

A consideration of the foregoing shows that we are not sufficiently equipped to meet contingencies such as I have described, particularly if they occur during a season of maximum demand.

AREA FOR FURTHER SUPPLIES:-

Having now dealt with the first part of the resolution, I pass on to the second portion as to area in which the Company should propose to put down further Pumping Stations.

In September 1911 Professor Lapworth reported at length on the water yield of the South Staffordshire District of Water Supply and the sites for new wells: the Directors had copies of this report supplied to them.

In his report Professor Lapworth pointed out that as each succeeding well had been put down in the past the difficulty of finding additional sites within the Company's area of supply had increased. I accompanied Professor Lapworth on many occasions all over the Company's area and he finally selected the following sites:-

Newhall, at Sutton Coldfield.
Little Hay,
Sandhills, near Shire Oak.
"The Birches" near Rugeley.

These sites were regarded at the time as being probably the only remaining ones within the Company's District which could be expected to give a yield up to 1½ million gallons per day each. I gathered from Professor Lapworth that if the Company would be satisfied with a yield of 1 million gallons, as they were some years ago, he could probably select one or two more sites.

Professor Lapworth in his report mentioned that the water-bearing rocks within the Company's limits of Supply are situate in five distinct areas, which he indicated on a map marked "B". These five areas he designated Smethwick, Kingswinford, Burton and Repton, Lichfield and Sutton, and Cannock Chase.

He definitely excluded the area of Smethwick, because of its limited extent and the fact that it is already over-pumped by private wells. He excluded the Kingswinford area on account of the large quantity of water already being extracted by the Water Company, and he excluded the Burton-Repton area on account of unfavourable geological conditions.

Professor Lapworth next referred to the Sutton--Lichfield area and selected the 3 sites of Newhall, Little Hay and Sandhills.

The experience with regard to Newhall, coupled with the terms of his report, almost debars the further consideration of several alternative sites in this district.

The Professor points out that the North-East half of the Lichfield-Sutton area must be ruled out of consideration as the ground is already pumped. He indicates this excluded area onthe map "B".

The only other site within the Company's Limits that he selected was in the Cannock Chase area - "The Birches".

Other sites suggested (but of probably lesser water yield) were:-

1. Triangle, Chasetown.
2. Ashmore Brook or Billson's Brook, near Farewell, Stoneywell or Hanch.
3. Fradley Junction (canal)
4. One of the two sites near Swinfen.
5. Longdon, near Beaudesert Park.

6. Mill Green or Little Aston.

In the final paragraph of his report of September 1911, Professor Lapworth says that each of the sites selected were by no means certainties and that they should be regarded more in the nature of promising experiments.

In conversation with Professor Lapworth the question of obtaining supplies ffom without the Company's present limits of supply was referred to and particularly in the area about Penkridge and Brewood, to the West of this Company's limits in the neighbourhood of Cannock, to the North of Wolverhampton.

The rocks in this locality are of an excellent water-bearing character and I am of opinion calculated to yield a far greater quantity of water than any available area within the Company's present limits.

I may remind the Board that the district in question is within the area of the Cannock Rural District Council, that we already supply the Parishes of Great Wyrley and Penkridge with water in bulk, that we have an Agreement for giving an auxiliary supply to the Parish of Cheslyn Hay, and that we have certain obligations regarding the Parish of Hatherton.

But it is possible that Parliament would not entertain the Company's application to go outside their present limits until they could definitely say they had exhausted the resources within the limits.

Having regard to the foregoing, I am of opinion that the Board should seek powers to make Pumping Stations at each of the three sites which have been selected by Professor Lapworth as being the nest in the Company's area, viz:-

Little Hay,
Sandhills,
"The Birches"

and that before carrying out expensive Works (if an Act of Parliament is obtained) trial borings should be put down and tests made of the yield.

Before however finally deciding, it would no doubt be adviseable for a Geologist to go through all the evidence, as it might be possible to select an alternative or additional site or sites from among the other suggested sites.

H. ASHTON HILL,

30 April 1914.