Office Copy

June 1922.

U T T O X E T E R U R B A N D I S T R I C T C O U N C I L .

U T T O X E T E R W A T E R S U P P L Y .

SCHEME FOR AUGMENTING THE SUPPLY OF WATER TO THE TOWN OF UTTOXETER FROM QUIXHILL SPRINGS.

: D E S C R I P T I O N O F W O R K S .:

The existing scheme of water supply to the Town of Uttoxeter was carried out in the years 1893-4, an Act of Parliament having been obtained in 1892 authorising the works.

The present supply is obtained from the following sources, the minimum yields of these sources as gauged in July 1921 being:-

Bramshall Springs	48.000	gallons per day.
Somershall Springs	21.000	" " "
Overflow from Station Borehole	31.000	" " "
	100.000	" " "

The Bramshall Springs are situated about 1½ miles to the west of the town, the water from these flowing by gravitation to a service reservoir having a capacity of 150.000 gallons, an 8-inch trunk main conveying the water to the town.

The Somershall Springs are situated about 3 miles to the east of the town, and the water being collected into a small tank

and conveyed by means of a 6-inch main to the town. The Somershall tank is a few feet higher than the Bramshall Reservoir.

The Borehole - which is 670 feet in depth - is situated in the town near the Railway Station and is an overflowing one, the overflow only being utilised for the supply of the town, the water being pumped direct into the distributing mains.

The borehole water is not considered satisfactory as it has to be filtered. In consequence it is desired to abandon this source as soon as possible.

The population at present served by the scheme is 5460; the supply for some time has been insufficient, the water being turned off during certain hours of the day in various parts of the town in order to maintain a supply.

The minimum yield of the springs and borehole affords a supply of 18½ gallons per head per day, but as 3.484.000 gallons was supplied in the year 1921 for trade purposes, this reduces the consumption by about 2 gallons per head per day.

Not only is this supply found to be altogether insufficient but additional supplies are needed for trade purposes and to enable some 400 ashpit privies to be converted into water closets.

The following is the data upon which the present requirements of the town are arrived at:-

	Gallons per 24 hours.
5460 population at 25 gallons per head	136.500
Trade Purposes	12.500
For conversion of privies to water closets	8.000
	157.000
Assuming that the Bramshall and Somershall Springs are retained, the minimum yield of these is	69.000
Borehole abandoned.	
The additional quantity of water required is	88.000

Under the scheme it is proposed to augment the supply by 100.000 gallons per 24 hours to meet present requirements, but the works are designed for an ultimate supply of 150.000 gallons

per day which will allow for an increase of 25% in the population to be supplied.

The source of the proposed additional supply is from springs at Quixhill near Crumpwood Weir situated about 6 miles north of Uttoxeter on the River Churnet which forms the boundary between the parishes of Denstone and Prestwood.

The land on which the springs take their rise has been purchased by the Uttoxeter Urban District Council. There are two main springs, one being on the north side of the river known as the'Wood Spring'and one on the south side of the river known as the'Railway Spring'. Gaugings of these springs have been taken as follows:-

Wood Spring.

July 6th., 1898	261.000	gallons per 24 hours.
August 2nd 1898	285.000	: : : :
January 9th 1899	420.936	: : : :
August 17th 1921	228.960	: : : :
August 25th 1921	228.960	: : : :

Railway Spring.

September 10th 1921	237.600	: : : :
September 19th 1921	237.600	: : : :

The 1921 gaugings were taken in a very dry year after a long period of drought and can be relied upon as the probable minimum yield.

It will therefore be seen that there is a total of over 450.000 gallons of water per day available which is considerably more than is likely to be required for the Town of Uttoxeter.

As the Railway Spring is at a somewhat higher level and has a slightly higher yield, it is proposed to utilise this spring only at present, leaving the Wood Spring to meet future requirements.

The level of the Railway Spring is 304 feet above ordnance datum and as the levels of the town of Uttoxeter vary from 240 feet to 369 feet, it will be seen that there is no possibility

of obtaining water from this source by gravitation.

The water will be conveyed from a collecting chamber at the spring through an 8-inch pipe to appump-well having a capacity of 5400 gallons to be constructed at the Pumping Station. A large pump-well is not required as the minimum yield of the one spring now proposed to be utilised is sufficient to maintain the supply during the maximum rate of pumping.

For the purpose of pumping it is proposed to utilise the water-power of the River Churnet at the Crumpwood Weir.

The following gaugings of the flow of the river have been taken at this weir when the river has been low:-

July 5th 1898	24.611.000	gallons	per	24	hours.
October 15th 1898	20.995.400	:	:	:	:
November 1st 1898	28.413.500	:	:	:	:
January 6th 1899	32.356.000	:	:	:	:
August 13th 1906	18.545.760	:	:	:	:
December 23rd 1921	24.937.500	:	:	:	:

The maximum fall ovailable is 7'0" which is at the time of minimum flow but in flood time the fall available is considerably diminished for short periods. Daily records are being kept during this year of the fall available each day as less than 3'0" fall is taken as being useless for power purposes.

From January 1st., up to February 5th 1922 there had been 12 days on whihh the working fall available was under 3 feet since which date up to the end of May there have been no occasions when the fall available has been under 3 feet and only 4 days on which the working fall has been less than 5 feet, which is ample for pumping the required quantity of 10.000 gallons per hour by means of turbines proposed to be installed.

From observations made it is considered that there will seldom be too small a quantity of water in the river to provide the power required for the turbines and it is estimated that the turbines will not be prevented from working by reason of floods for more than 30 days in the year.

The pumping plant will consist of three vertical shaft "Turgo" Turbines each capable of developing 11 b h.p. with a working fall of 5'6" using 1350 cubic feet of water per minute. and three horizontal treble ram pumps 5½" diameter by 9" stroke. Two of these turbines and pumps will be together capable of raising the I00.000 gallons of water required per day in I0 hours, the quantity of water used for this duty being at the rate of 24.300.000 gallons per 24 hours. Should the fall available be less than 5'6", the same quantity of water could be pumped by working longer hours. When there is a less head available the quantity of water available is largely increased and the third or standby turbine and pump can be utilised.

In order to provide for standby power when the river is in flood, it is proposed to instal one 25 b.h.p. oil engine which will be capable of driving all three pumps. It should also be pointed out that at the time of the year when floods are most likely to occur the Bramshall and Somershall Springs will probably be giving a much higher yield than their minimum and less water would consequently be required from the Quixhill ~~Scheme~~ source.

The Pumping Station will be a substantial building of brickwork on concrete foundations and having a slate roof, the dimensions of the main building being 28'0" x 21'0". It would be erected adjoining the Crumpwood Weir so that only short head and tail races are necessary, these being constructed of concrete floors and brick walls.

The water will be pumped from the pump-well through a rising main 7-inches in diameter and 1550 yards in length to a high level reservoir to be constructed at Prestwood, against a head including friction of 228 feet when pumping at the rate of I0.000 gallons per hour, andthe velocity through this main will be 1.7 feet per second.

The Prestwood Reservoir which will be situated in Field No. 93 on the 1/2500th ordnance map Staffordshire No.XX,15 Second Edition 1900, will be constructed with concrete foundations and floor, walls of brickwork in cement mortar, and will be covered

with a reinforced concrete roof carried on division walls.

The Reservoir will be 40 feet by 40 feet by 10 feet depth of water and will have a capacity of 100.000 gallons. Eight ventilators will be provided in the roof of the Reservoir.

The top water level will be 512.00 above ordnance datum, the reservoir being placed on practically the highest point of Prestwood Hill.

The water will gravitate from this reservoir through a 7-inch cast iron main to the existing service reservoir at Bramshall the top water level of which is 383.00 above ordnance datum.

This 7-inch main will be laid from Prestwood Reservoir along Prestwood Lane and across private lands to Quixhill Farm, thence along the main Uttoxeter to Cheadle Road past Denstone Village, the Township of Rocester, Brook End, Crakemarsh to a point near "The Three Tuns" at "The Heath" Uttoxeter, thence along the Heath Road and Bramshall Road to the existing service reservoir.

There are two railway, two small river, and several small stream crossings on the route of the mains, details of these being shown on the drawings.

Sluice Valves are provided at controlling points, washouts at the lowest and air valves at the high points on this main and three hydrants for fire purposes will be fixed along Heath Road Uttoxeter in order to make provision for fire purposes, the pressure from the Bramshall Reservoir being insufficient at this point.

The total length of main from Prestwood Reservoir to Bramshall Reservoir is 11.770 yards and the hydraulic gradient 1 in 302 which will give a discharge through this main of 205 gallons per minute or 295.200 gallons per 24 hours.

EXTENSION OF MAINS TO SUPPLY HIGH LYING HOUSES ON THE BURTON ROAD NEAR THE URBAN DISTRICT BOUNDARY.

Owing to the want of sufficient pressure due to the levels, the size of the mains, and the draw off in the town it is found impossible to supply the houses on the Burton Road near the southern boundary of the town either from the Bramshall Reservoir or from Somershall. It is therefore proposed under this scheme to supply these properties from the new 7-inch main conveying water from Prestwood to Bramshall Reservoir.

To enable this to be done a 5-inch main will be laid from Moorland Cottage along Heath Road and Stafford Road to Mount Pleasant where it will be connected with the existing 3-inch main in Stone Road.

A new 3-inch main will be laid along the Burton Road from the end of the existing main in Woodleighton Lane to the Urban District boundary near Leighton Cottage.

The new 5-inch main from Moorland Cottage to Mount Pleasant, the 3-inch main in Stone Road, short lengths of 4-inch main in Carter Street and Balance Street, and the 3-inch and 2-inch mains from Balance Street past Pinfold Crossing along Woodleighton Lane and Burton Road and Hockley Road will then be under pressure from the 7-inch supply main and an adequate supply to the high level houses on Burton Road will be assured.

Sluice Valves will be provided on the existing mains at Stone Road, New Street, Carter Street, Balance Street and at Pinfold Crossing which will entirely cut off the high pressure mains from the other portions of the town which will continue to draw their supplies from Bramshall Reservoir as at present.

WILLCOX & RAIKES.M.M.I.C.E

Westminster & Birmingham.

UTTOXETER URBAN DISTRICT COUNCIL.

UTTOXETER WATER SUPPLY.

SUMMARY OF INFORMATION IN CONNECTION WITH SCHEME.

Population to be supplied	5460
Anticipated daily consumption per head.	25 gallons per head. 12.500 gallons per day for trade purposes.
Total daily consumption.	157.000 gallons (estimated).
Total dry weather yield from source of supply in 24 hours.	Total lowest gauging from the two springs available 466.560 gallons per 24 hours.
Give a list of all recorded gaugings and state method of gauging with dates.	WOOD SPRING. Date. — Gallons. 6th July 1898 — 261.000 2nd Aug. 1898 — 285.000 9th Jan. 1899 — 420.936 17th Aug.1921 — 228.960 25th Aug.1921 — 228.960 RAILWAY SPRING. 10th Sep.1921 — 237.600 19th Sep.1921 — 237.600 All gaugings taken over a rectangular weir.
Give dimensions and capacities of Reservoirs.	Prestwood Reservoir 40'0" x 40'0" x 10'0" depth of water. Capacity 100.000 gallons.
In case of a supply from a spring state whether the water flows from or into a defined course or is merely lost in swamp etc, and describe surrounding land whether pasture or arable or moorland etc, and the distance to the nearest house etc, farm buildings or any point which might possibly cause contamination.	Water flows from both springs in defined channels Surrounding land practically all pasture and woods. Nearest house a small farm 220 yards away from Railway Spring. Only four farms within half a mile of the springs and all these so situated that there is no risk of contamination.

Level of springs or source of supply.	Railway Spring 304.00 O.D. Wood Spring 300.00 O.D.
Level of land at Pumping Station.	303.00 O.D.
Top water level of Reservoir.	Prestwood Reservoir 512.00 O.D.
Head against which pumps will have to work.	Actual Lift 217 feet. Lift including friction 228 feet.
Highest point of district to be supplied	369.00 (near Urban District boundary, Burton Road).
Lowest point of District to be supplied	240.00 O.D.
Level of washout, lowest point on line of pipes.	264.00 O.D.
Greatest pressure the pipes are under.	248 feet.
At what depth measured from top of pipe to surface is it proposed to lay the mains.	3 feet.

The following are copies of recent certificates of Analysis of the water from the two springs referred to in the Description of Works:-

WOOD SPRING.
-X-X-X-X-X-X-

Analysis of and report on a sample of water received November 21st 1919 marked "Quixhill Spring"

	Grains per gallon.
Total solid matter dried at 100°c.	59.8
Chlorine as Chlorides	14.7
Saline Ammonia	Absent
Albuminoid Ammonia	0.0028
Nitrates	Absent
Nitrogen as Nitrates	Absent
Physical examination	Clear, colourless, and free from odour.

In our opinion the above results show this water to be of good quality and suitable for use for drinking purposes.

(sgd) Southall, Brothers & Barclay, Ltd.,
Manufacturing Chemists,
Lower Priory,
BIRMINGHAM.

- - - - - - - - - - - - - - - - - -

RAILWAY SPRING.
-X-X-X-X-X-X-X-

Analysis of and report of a sample of water received 12th December 1921 marked "Taken from Springs - Crumpwood - south-west side of River Churnet".

	Grains per gallon.
Total solid matter dried at 100° c.	57.8
Chlorine as Chlorides	14.0
Saline Ammonia	0,0014
Albuminoid Ammonia	Absent.
Nitrates	Absent
Nitrogen as Nitrates	1.6
Physical examination	Appearance clear, colourless, No odour.

Hardness	Temporary as $CaCO_3$	11.7
	Permanent ditto	10.9

We have made a careful examination of this sample and have obtained the above results.

In our opinion these figures indicate that the water is of good quality and is suitable for drinking purposes.

The hardness, nearly half of which is permanent, is rather large in amount but we do not consider it sufficiently high to be objectionable for ordinary domestic purposes.

(sgd) Southall Brothers & Barclay, Ltd.,
Manufacturing Chemists,
Lower Priory,
Birmingham.

- - - - - - - - - - - - - - - - - -

The second or Railway Spring is the one proposed to be used under the present scheme leaving the Wood Spring for use at a later date if required.

UTTOXETER URBAN DISTRICT COUNCIL.

QUIXHILL WATER SCHEME.

Description of Work.	Cost. £. s. d.	To £.
Mains.		14774. IO. -
Hydrants.		90. -. -
Sluice Valves.		191. -. -
Air Valves.		180. -. -
Washouts.		320. -. -
Collecting Works at Springs.	100. -. -	
Pump Well. 5400 galls. £40.	216. -. -	
Engine House. 28 x 21 @ 2/- cu. ft.	1360. -. -	
Head Race & Tail Race.)	1200. -. -	
Three 11 B.H.P. Turbines)		
Three Throw Pumps.)	2350. -. -	
One 25 B.H.P. Oil Engine)		
Suction & Delivery Pipes, hand rail, floor plates etc.	250. -. -	
Roads and Fencing.	500. -. -	
Reservoir. 100000 gal @ £20.	2000. -. -	
Two connections to Mains. £40.	80. -. -	
Connection to Bramshall Res. including equilibrium valve.	250. -. -	8366. -. -
GENERAL EXPENSES.		
Land for Reservoir.	100. -. -	
Easements, 2,000 yards @ 3/-.	300. -. -	
Engineering.	750. -. -	
Legal.	250. -. -	
Clerk of Works.	400. -. -	
Contingencies.	1638. IO. -.	3438. IO.
	TOTAL £	27.300. -. -