


S. S. W. W.

DESCRIPTION OF PUMPING STATIONS
1921.

VOL. I

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ENGINEER.

SOUTH STAFFORDSHIRE WATERWORKS COMPANY.

PUMPING STATIONS.

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and supplementary
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situate near

LICHFIELD in the County of STAFFORD.

S U M M A R Y

Total Engine Power at Station
is equal to 2,000,000 Gallons
per 24 hours.

No. 1. Engine. Power per Day = 1,000,000 Gallons.
No. 2. Engine ditto = 1,000,000 do

TOTAL SPECIFIED HEAD = 530 Feet

C O S T S

	<u>£.</u>	<u>s.</u>	<u>d.</u>
Land and Law Charges ...	2,777.	0.	2.
Making Well ...	2,556.	8.	0.
Sinking Borehole	210.	10.	3.
Engine and Boiler Houses ...	3,127.	9.	6.
Cottages ...	1,527.	4.	5.
No. 1. Engine & 2 Boilers ..	5,473.	15.	0.
No. 2. Engine & 1 Boiler ...	4,320.	16.	2.
Sundries ...	546.	0.	0
VENTURI METER AND RECORDER	<u>695.</u>	<u>0.</u>	<u>9</u>
<u>TOTAL COST</u>	<u>£ 21,234.</u>	<u>4</u>	<u>3.</u>

Station Commenced - 1891.

Station Completed - 1897.

LAND (5 acres, 3 roods, 13 poles, 3 yards.)

Purchased in May 1891 from the Earl of Lichfield, Viscount Hanson.

Level of E.H.F. above O.D. ... 214.07 Feet.

CONTRACTORS.

WELL.

Commenced by Sidebottom, ... 1891.

Completed by South Staffordshire Waterworks Co.) 1892.

BOREHOLE

Sunk by F. Coulson, ... 1892.

BUILDINGS.

Engine & Boiler Houses

T. Lowe & Sons, ... 1891 - 1892

COTTAGES (4)

T. Lowe & Sons, ... 1892 - 1893.

ENGINES.

No. 1. Engine

Hathorn, Davey & Co. ... 1891 - 1892

No. 2. Engine.

Hathorn, Davey & Co ... 1896 - 1897.

BOILERS (3)

Spurr, Inman & Co. ... 1891.

C O S T S

		<u>£</u>	<u>s</u>	<u>d</u>
Land and Law Charges	...	2,777.	0.	2.
Making Well	... ..	2,556.	8.	0.
Sinking Borehole	... ..	210.	10.	3.

c/d Ford. £ 5,543. 18. 5.

<u>COSTS</u> (Continued)	B/t Ford.	£	s	d
		5,543.	18.	5.
Engine & Boiler Houses .		3,127.	9.	6.
Cottages		1,527.	4.	5.
No.1. Engine & 2 Boilers ..		5,473.	15.	0.
No.2. Engine & 1 Boiler ...		4,320.	16.	2.
Sundries		546.	0.	0.
<u>TOTAL COST</u>		£ 20,539.	3.	6.

ENGINE HOUSE

Internal Dimensions. Length ...	58 Ft - 0 Ins.
Width ...	26 Ft - 0 Ins.
Height to top of Wall Plate ...	23 Ft - 2 Ins
Depth of Foundations ...	13 Ft - 1 In.

BOILER HOUSE.

Internal Dimensions. Length ...	58 Ft - 8 Ins.
Width ...	29 Ft - 0 Ins.

WELL.

Diameter ...	12 Ft - 0 Ins.
Total Depth from E.H.F. ...	184 Feet
Top of Well from E.H.F. ...	11 Feet

BOREHOLE

Diameter, Top Part ...	12 Ins.
Depth do ...	91 Feet
Diameter, Lower Part ...	4 Ins.
Depth ...	130 Feet.
Total Depth of Well and Borehole combined, from E.H.F. ...	405 Feet.

NOS 1 AND 2 ENGINES

These Engines are of the same
size and capacity in every respect.

ENGINES NOS 1 AND 2.Compound Horizontal Tandem Differential
Surface - Condensing.CAPACITY

Specified Net Quantity equals
1,000,000 Gallons per 24 hours
at 140 feet per minute.

SPECIFIED HEAD.

Specified depth of Well ...	180 Feet
Head on Delivery Main (including friction)	350 Feet
<u>TOTAL SPECIFIED HEAD</u>	<u>530 Feet.</u>
Pump Horse Power at 140 ft per Minute ...	111.5.
Double Strokes per Minute ..	14

RIISING MAINS OR LIFTS.

Distance apart - each Lift ...	4 Ft - 2 Ins.
Number Lifts to each Engine ...	2
Diameter, Cast Iron Pipes ...	15 Ins.
Length ditto ...	9 Feet
Thickness, Metal ...	$\frac{7}{8}$ In.
Diameter, Flanges ...	21 $\frac{3}{4}$ Ins
Thickness do ...	1 $\frac{1}{4}$ In.

Each Lift consists of 15 lengths
of 9 Ft. Piping, one of 6 Ft.,
Working Barrel & Suction Valve Box,
Suction Pipe & Snore Valves, Top
Guide Length and Closing Length.

WORKING BARRELS (CAST IRON)

Diameter	...	...	14 Ins.
Length	...	...	6 Ft - 6 Ins.
Thickness of Metal	...	...	1 $\frac{3}{8}$ In.
Diameter, Flanges	...	...	21 $\frac{3}{4}$ Ins.
" Working Barrel (Present)	...	...	14 $\frac{1}{2}$ Ins.

NOTE:- Diameter 14" is the
Original Diameter of these
Working Barrels.

SUCTION VALVE BOXES.

Diameter, smallest part	...	...	15 Ins.
Length	...	...	4 Ft - 6 Ins.
Thickness, Metal	...	...	1 $\frac{1}{8}$ In.

Suction Valve Boxes were fitted with
Gunmetal Seats at the same time as
the Working Barrels were bored out
to 14 $\frac{1}{2}$ Inches.

No. 1. Engine, altered, October, 1912.

No. 2. Engine " February, 1914.

SUCTION PIPE (CAST IRON)

Diameter	...	...	12 Ins.
Length	...	...	6 Feet.
Diameter, Flanges	...	...	18 $\frac{3}{4}$ Ins.

SNORE PIECE (CAST IRON)

Diameter, smallest part	...	...	12 Ins.
Length	...	...	2 Ft - 6 Ins.
Number, Holes	...	...	300
Diameter, Holes	...	...	1 In.

WELL PUMPS.

Pumps actuated by Compensating
Discs and Rods from Engine
Crossheads.

WELL PUMP BUCKETS & CLACKSCast Iron Hat Band Valves

Diameter, Bucket	...	..	14 $\frac{1}{2}$ Ins.
Stroke do	...	..	4 Ft - 6 Ins.
No. Tiers of Hat Bands	..	..	4
Inside Diameter. 1st I.R. Band.	..	..	11 $\frac{1}{2}$ Ins.
2nd do	..	..	9 $\frac{5}{8}$ Ins.
3rd do	..	..	8 $\frac{1}{2}$ Ins.
4th do	..	..	6 $\frac{5}{8}$ Ins.
Depth .. 1st do	..	..	5 $\frac{1}{2}$ Ins.
2nd do	..	..	5 Ins.
3rd do	..	..	5 Ins.
4th do	..	..	4 $\frac{1}{2}$ Ins.
Thickness of all India-Rubber Bands,			$\frac{3}{8}$ Ins.

SUCTION VALVES OR CLACKS

Diameter, Clacks at Seat	..	13 $\frac{1}{2}$ Ins.
" Well Pump Rods	..	3 $\frac{1}{2}$ Ins.

I.R. Bands for Clacks, are as
for Buckets, with the exception
they are $\frac{1}{2}$ In. thick instead of $\frac{3}{8}$ In.

Well Pump Guides in one Lift	..	8
Diameter, Guides	...	14 $\frac{1}{2}$ Ins.
Length Parallel Couplings between Pump Rods	...	15 Ins.
Turned part of Rod inside Coupling		3 $\frac{1}{2}$ In. dia.

STEAM CYLINDERS.

Diameter, H.P.	...	...	27 Ins.
" L.P.	...	...	48 Ins.
Stroke of Engine	...	...	5 Feet.

Cylinders are Steam Jacketted.

PISTON RINGS

Goodfellow's Patent.

Piston Rod Packings - Soft.

PISTON RODS

Diameter, Front End H.P.	...	4 Ins.
Centre	...	5 $\frac{1}{2}$ Ins.
Back End, L.P.	...	4 Ins.

ENGINE VALVE GEAR

Valves are actuated in accordance with
Davey's Patents, and the Gear is Steam
Driven. Slide Valves fitted with
Meyer's Cut-off, adjustable by hand.

DIFFERENTIAL GEAR

Diameter, Steam Cylinder	...	9 Ins.
Stroke, Gear	...	9 Ins.
Diameter, Water Cylinder	...	8 Ins.
Stroke, Gear	...	9 Ins.
Diameter, Pausing Cylinder	...	4 Ins.

Piston Rings in Steam Pistons

Buckley's type, No. 2.

No. 1. Engine only.

Diameter, Steam Piston Rods	...	2 Ins.
" Water ditto	...	2 $\frac{1}{8}$ Ins.

AIR PUMPS

Two Single-Acting Vertical Pumps
actuated by Lever from Compensating
Discs.

Diameter	...	...	14	Ins.
Stroke	...	...	18	Ins.
<u>Valves - India Rubber.</u>				
Diameter, Foot Valves	...	...	10 $\frac{1}{2}$	Ins.
" Bucket Valves	...	...	13	Ins.
" Bucket Rod	...	...	2 $\frac{1}{8}$	Ins.
" Inlet	...	...	6	Ins.
" Outlet	...	...	5	Ins.

FORCE PUMPS

Double-Acting Piston Pump Driven
by L.P. Piston Tail Rod.

Diameter, F.P. Piston	...	...	13	Ins.
Stroke Pump	...	...	5	Feet
Diameter, F.P. Piston Rod (Front end only)	...	...	4	Ins.
Gallons discharged per double stroke,	...	...	54.74	
Multiplier given to Foreman	...	...	54	
Excess of discharge of Well Pumps)				
over Force Pumps)			9.61	%

FORCE PUMP VALVES

Cast Iron Double Beat with Gutta-
Percha Beats.

Number, Suction Valves	...	...	2	
" Delivery Valves	...	...	2	
Diameter, Seat of Suction Valves .	...	...	15 $\frac{1}{2}$	Ins.
" " Delivery Valves.	...	...	17 $\frac{1}{2}$	Ins.
Free lift of Valves	...	...	$\frac{1}{2}$	In.

CONDENSER

Open type with Tubes expanded into
Tube Plates. Condenser placed in
Force Pump Suction Tank.

Cooling Surface	...	...	310 Sq. Ft.
Ordinary Tubes. Number	...	...	132 .
	Length	...	6 Ft - 1½ Ins
	Diameter, Ext...	...	1½ Ins.
	Thickness	...	17 B.W.G.
Stay Rods. Number	...	...	1
(Iron). Diameter	...	...	1½ Ins.
Tube Plates. "	...	...	2 Ft - 9½ Ins
	Thickness	...	1 In.
Distance apart over Tube Plates .			6 Ft - 1 In.
Pitch of Tubes	...	...	2 Ins.
Diameter, Exhaust Inlet	...	...	11½ Ins.
" Outlet	...	...	6 Ins.

AIR DELIVERY VESSEL (CAST IRON)

Total Height, inside ..	...	...	15 Ft - 0½ In
Diameter "	...	...	2 Ft - 3 Ins
Height above Branches .	...	...	13 Ft - 11 "
Thickness, Metal	...	...	1½ Ins.
Working pressure	...	...	100 Lbs.
Capacity above Branches	...	...	55 C. Ft.
Total Capacity	...	...	60 C. Ft.

OVERHEAD TRAVELLING CRANE

Made by Messrs Craven, Manchester.

Load	...	...	10 Tons.
Span	...	...	26 Feet
Height from E.H.F. (to top of Crane Rail)	...	...	14 Ft - 6 Ins

FEED WATER FILTER

(see page 10) 9.

FEED WATER FILTER.

Made by The Harris Patent Feed Water
Filter Co. Ltd, Newcastle-upon-Tyne.

Maker's No. on Filter -1106

AIR CHARGERS ON AIR VESSELS.

Made by Hathorn, Davey & Co., Leeds.

Diameter, Suction Pipe	...	1 $\frac{1}{4}$	Ins.
" Delivery "	...	$\frac{1}{2}$	Ins.

BOILER FEED PUMPS.... 2

Horizontal-Rotary type, made by
Hathorn Davey & Co, Leeds.

Diameter, Steam Cylinder	...	4 $\frac{5}{8}$	INS
" Pump Piston (Water)	...	3 $\frac{3}{8}$	Ins.
" Pump Plunger	...	2 $\frac{1}{4}$	Ins.

STEAM BOILERS 3

Lancashire type, made by -

Spurr, Inman & Co., Wakefield.

Diameter	...	...	6 Ft - 6 Ins.
Length	...	...	26 Feet
Thickness, Shell Plate	...	...	$\frac{3}{8}$ In.
" End "	...	...	$\frac{1}{2}$ In.
Diameter, Internal Flues . Front End,			2 Ft - 6 Ins.
Back End,			2 Ft - 1 In.
Thickness, Flue Plates.			
Front End Section	...	...	$\frac{5}{8}$ In.
Intermediate "	...	...	$\frac{3}{8}$ In.
Back End "	...	...	$\frac{3}{8}$ In.
Diameter, Circular Manhole	...	...	16 Ins.
Steam pressure, per square inch	...	...	60 Lbs.
Total Heating Surface	...	...	740 Sq. Ft.

MOUNTINGS ON EACH BOILER

One Junction Valve	...	...	6 Ins dia.
" Compound Safety Valve	..	...	3 Ins "
" Balanced Lever Safety Valve	...	...	4 Ins "
" Hopkinson's Feed Valve	...	...	2 Ins "

Two Sets Water Level Gauges.

One Steam Pressure Gauge

LUBRICATORS.

One Sight Feed Lubricator, made by
Messrs C. Winn & Co. for internal
lubrication of Main Engine No. 1.

Maker's No. on Lubricator
561.

One 1/3 Pint Winn's Victor Sight Feed
Lubricator for Differential Gear, No.
1 Engine. Maker's Number, 5479.

One Sight Feed Lubricator for internal
lubrication of Main Engine

No. 2.

No. Name or Number on same.