Reprinted from: Gloucestershire Society for Industrial Archaeology Journal for 2012 pages 25-35

# WATER SUPPLY IN THE DURSLEY AREA 1890 - 1974

**Peter Harris**

## Introduction

At the top end of the aptly named Water Street, behind St. James's Parish Church and close to its junction with the busy Silver Street in Dursley, lies a pond known as the Broadwell. This, together with the adjoining St. Mary's Well, the Nun's or Dipping Well and others, rise from numerous underground springs which surface at this particular point. The presence of these springs must have been a major factor in the establishment of the original settlement. Indeed, right up until the end of the 19th century the springs, along with numerous wells that were sunk, provided the inhabitants with their water-supply. Today, we take it for granted that when we turn on the tap we are supplied with pure clean water. This article looks at the way in which water supply in the Dursley area was transformed from springs and wells into the present comprehensive network of reservoirs, pumping stations, water mains and supply pipes to consumers.

## Geology

With regard to water supply, it is fortunate for Dursley that it is located at the foot of the Cotswold Hills Escarpment (Fig. 1). Stinchcombe Hill to the west of the town rises to 800ft (230m) above sea level, and is capped by a 40m layer of Inferior Oolitic limestone of the Jurassic System which was deposited over 160 million years ago (1). Below this lies a very thin fossil rich deposit of fined grained oolites, marly clays and mudstones which separates it from the thick underlying unit of Upper Lias Cotteswold Sand which is some 50m thick in the Dursley area. These rocks are easily eroded and give rise to the steep valley sides in the area. Both the sands and the limestones above act like sponges, known as 'aquifers', and are able to store vast quantities of rain water which has fallen and percolated down over many previous years. Underneath these lie a 15m thick layer of the Upper Lias clays and sandstones and, as these are impermeable, large quantities of water seep out forming lines of springs along the many local valleys which source the many streams and brooks. Below these clays comes a 7m layer of hard reddish limestone known as Marlstone. This gives rise to steps or platforms, such as at Woodfield, Cam, where the stone was once quarried for building as can be seen in many

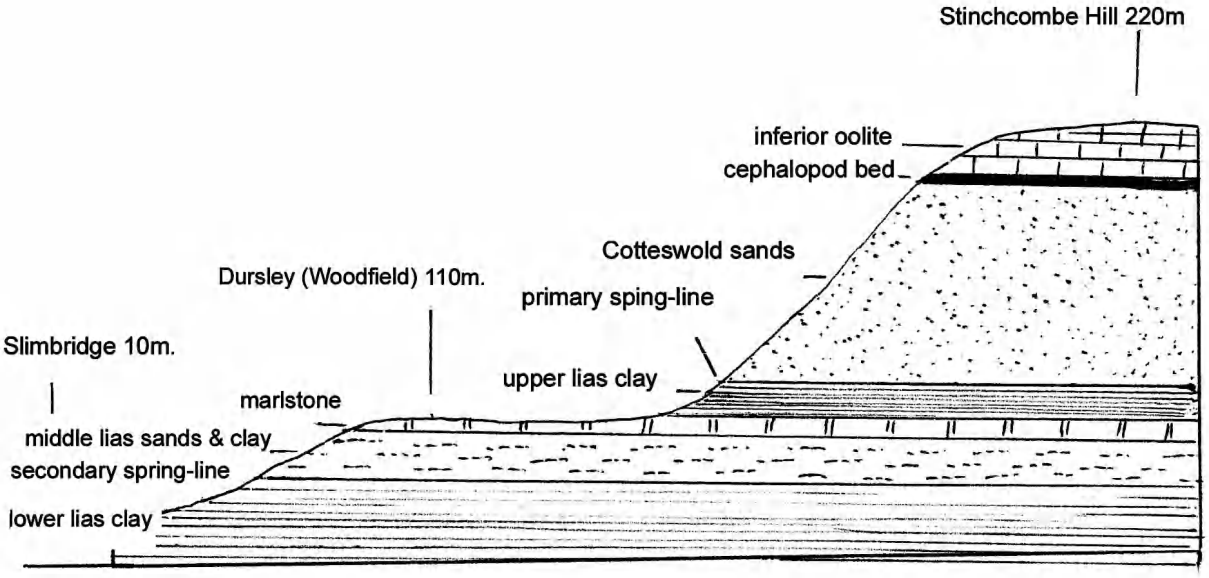



Fig. 1 Geological Section of the Cotswold Escarpment in the Dursley Area (After Richardson Ref. 2)

houses in Stinchcombe. Moving off this shelf the landform drops down again at places such as Taits Hill and Cam Pitch, through further clays, sands and silts of the Lower Lias which give rise to a secondary source of springs, before finally reaching the 80m thick lower lias clays of the Berkeley Vale. Thus it can be seen that the area had potentially very good water supplies providing the problems of making it available to the inhabitants could be overcome.

**Legislation for change (1848-1872)**

These sources of spring water were likely to become contaminated from time to time by the disposal of "night-soil" or sewage, industrial processes or farming practices. With the rapid increase in population and movement towards urbanisation during the industrial revolution, water-borne diseases such as cholera, typhoid and diphtheria, began to occur with ever increasing frequency and ferocity. This was particularly so in London, Manchester and other large cities throughout Britain. An outbreak of Cholera in Wotton-under-Edge in 1849 killed 40 people. The Public Health Act of 1848 (3) required each individual public health authority to separate water supply and sewage disposal by connecting all homes to a water supply and to lay down community drains for 'foul' water. This was supposed to be achieved within ten years but this rarely happened in rural districts, Dursley being no exception. These requirements were made more stringent by the Local Government Act of 1858. The Public Health Act of 1872 (4) saw the merging of Local boroughs, such as Dursley, into Municipal Boroughs. This now gave councils additional statutory rights to provide public baths and wash-houses, and to obtain water supplies from streams, wells and springs, by compulsory order if necessary. Dursley actually had a swimming pool during the mid 19th century. This was situated some 100m below the Broadwell springs. It was over 30sq m, varied in depth and was heated to 64ºF (18ºC). Due to the lack of subscriptions, Mr Ayliffe, the proprietor, closed it in 1880 (5).

**Late 19th Century Proposals**

The Gloucester Journal of 1898 reported on a proposal to use water from the Caswell Stream which ran through the site of Rivers Mill (the former Mawdsley's factory and now housing). Grid references for the main sites in the text are given in an Appendix. At the time the land belonged to William John Phelps Esq., of Chestal. He was willing to make this accessible in return for a free supply of water piped beneath the Uley Road up to his house, an arrangement which is believed to continue to this day. The land was purchased on 13 July 1898 and an exploratory source well, initially 56ft (17m) deep and 6ft 6in (2m) diameter, was sunk east of the town in Caswell Grounds below Folly Wood through the upper lias clays down on to the marlstone (6). The well (which became known as Dursley Well) was brick lined and concrete rendered down to 44ft (13.4m) and it was estimated by the consultant engineers that it would supply over 144,000 gallons (655cu m) per day, well in excess of the 30,000 gallons (136cu m) being the predicted needs of the Dursley and Cam Parishes. It was originally proposed that the water should be pumped by a windmill.

In the following year the Dursley Rural District Council applied to the Local Government Board to borrow £4,000 to carry out the installation and give the town its first public water supply. Over a dozen schemes had been considered during the previous twenty five years but all had been found to be unworkable. Following the Local Government Board public enquiry held at the Victoria Hall, Dursley, the inspector, Mr Charles Perrin, MInst.CE, having reviewed the evidence and receiving no objections, recommended the application. In order to get things moving, Mrs Eyre of Kingshill House**,** was prepared to make a donation of £1000 towards the town's share of the costs if the scheme commenced without further delay (7).

**First Pumping Station (Dursley Well 1902)**

Work on building a pumping station over the well actually began in November 1900 and it was hoped that the work would be completed by June 1901. The appointed engineers were Taylor, Sons and Santo Crimp of Westminster and the contractors were W.H. Smith & Son of Clifton, Bristol (8).

Fig. 2 Dursley Well pumping station (1902) looking East in 2012 prior to conversion to a dwelling

The building survives to this day and consists of a brick built machinery hall 12.6m x 7.2m built on very generous concrete foundations which are generally about 1m deep (Figs. 2 & 3). Near the foot of the walls runs a damp-proof-course of slate just below a double row of sloped stretchers. The red clay engineering bricks at 235mm x 112mm x 77mm, were slightly larger than the then standard by about 10%. Some have the name Shortwood stamped into the frog and would have been supplied by the Shortwood Farm Brickwork Company situated near Emerson's Green, North East Bristol. The firm was founded in 1865 by

Fig. 3 **FLOOR PLAN OF 1902 PUMPING STATION**

*by courtesy of Adrian Jenkins*

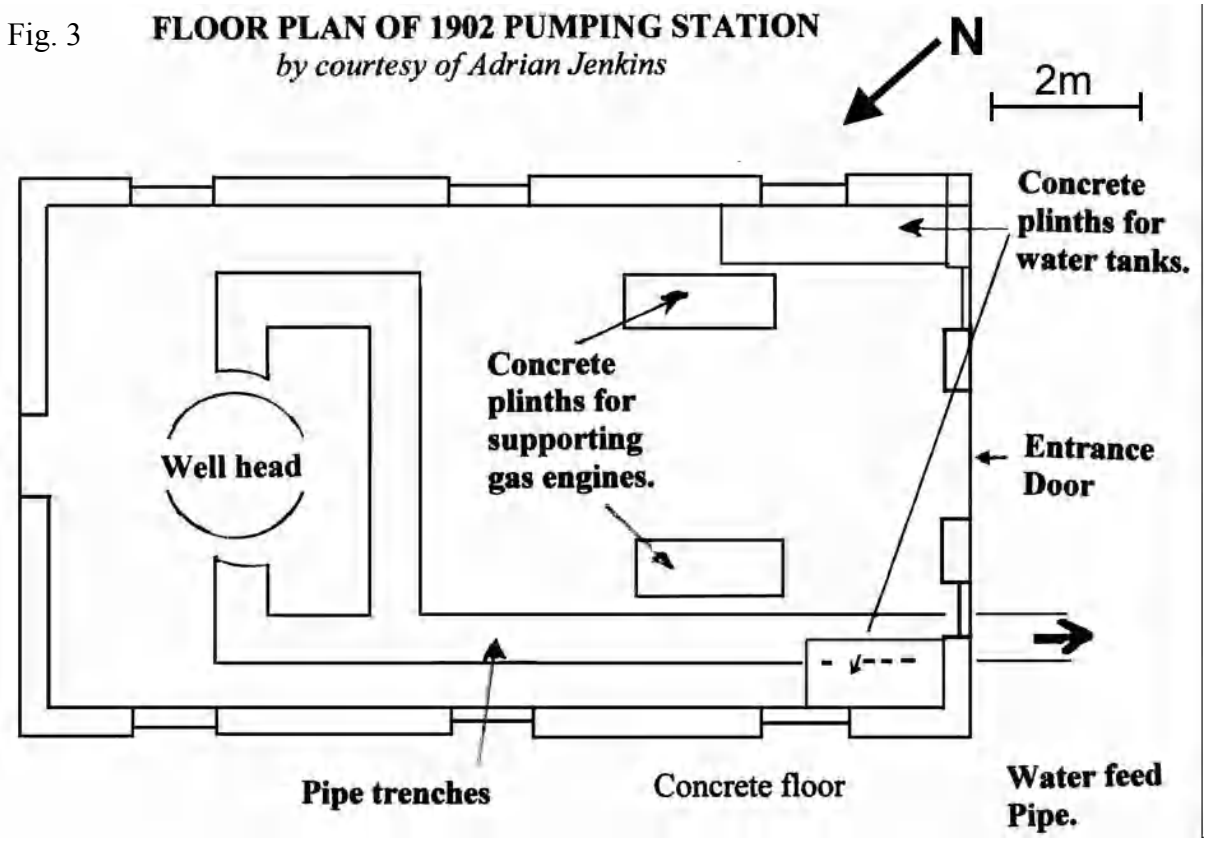


Fig. 4 Dursley Well pumping station (1902). Descending the well

Charles Richardson engineer to the Bristol & South Wales Railway and used the abundant deposits of clay laid down in the late Carboniferous Upper Coal Measure series. Over 30 million of these bricks were used to line the inside of the Severn Railway Tunnel. They were also used in the building of Hilliers Bacon Factory in Nailsworth. The window sills employed blue single bullnose wall cap engineering bricks, one example having 'Hamblets 1899 West Bromwich' stamped on to the front face. These were supplied by Hamblets Blue Brick Company (1851 – 1915) and had a good reputation for their engineering strength.

The height of the roof is 5.7m with walls 3.1m high. It is supported on substantial wooden trusses covered with Welsh slate. Along each long-side are three windows beneath arched brick lintels. Each was fitted with wrought iron glazing bars infilled with a number of glass panes. At the north end is an access door beneath a wooden louvred ventilator. The main entrance on the south side is through a large wooden door which sits between two smaller windows and under a further ventilator. The interior was covered with a substantially thick concrete floor in which were constructed 20 cm deep channels. In these a number of 6in (150mm) spun steel pipes were laid for carrying the pumped water, the flow of which was controlled by a series of gate valves supplied by Glenfield & Kennedy of Kilmarnock. Inside the doorway at each corner were two raised concrete plinths each supporting water tanks which were needed to cool the heavy duty industrial gas engines. The engines were anchored down on to two further, centrally located, concrete plinths. The engines were built and supplied by the Dudbridge Iron Works of Stroud (established in 1891 as Humpidge & Snoxell, later to be acquired by Holborow

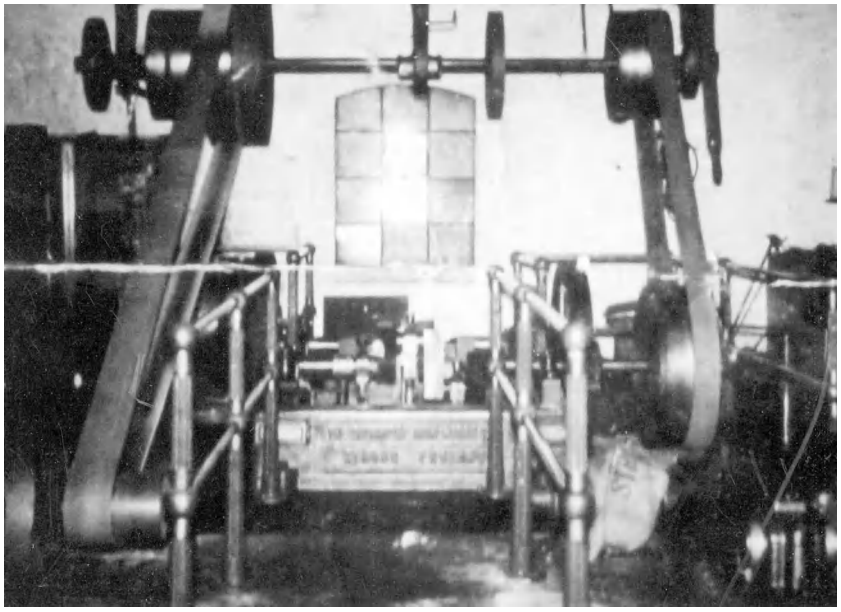


Fig. 5 Dursley Well pumping station (1902). Pulleys and driving belts

& Co.**)** (9). To power the engines it was necessary to lay a gas main all the way up the Littlecombe Valley from the Gas Works at Trolley Moors Orchard at the bottom of Kingshill Lane.

Over the top of the well (Fig. 4) was a cast-iron head-frame fitted with a pair of cast iron crank-shafts each turned by a herringbone-cut cog-wheel (Fig. 5). Each crank turned on two main bearings and had three con-rod journals spaced at 120º degrees, to which were connected phosphor-bronze rods which ran down the inside wall of the well, through a series of guide runners, to double action reciprocating plunger piston cast-iron cylinder pumps submerged in the water sump chamber below. The head frame was connected to the gas-engines via a series of belt-driven pulleys suspended from the roof beams .

With the laying of water pipes down into the town and the appointment of maintenance engineers, the scheme was finally commissioned in the Spring of 1902. By the standards of the time the design of this pumping station was architecturally basic and utilitarian but the choice of engines and pumps provided a smooth, consistent and reliable supply of water. Significant payments included for the engine house - £522, engines and pumps - £850, installation of reservoir and mains - £2910 and various fees - £356. More detailed information is given in Table 1.

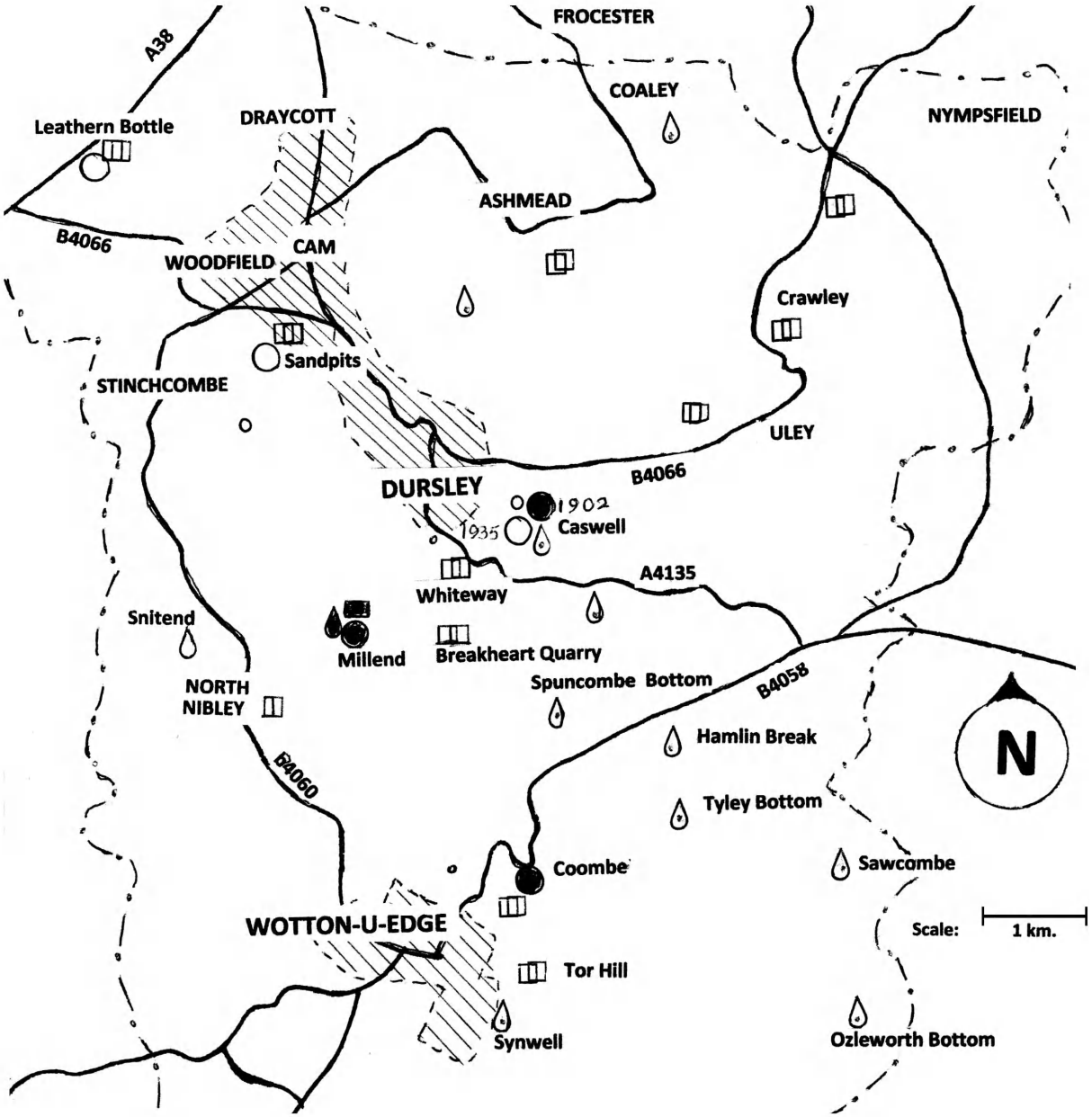
However, it quickly became apparent that the system was riddled with numerous leaking joints as reported in the Dursley Gazette (10). The Clerk to the Dursley R.D.C. wrote to the Parochial Committee with a statement of costs pointing out that, "Due to the incompetence of the contractors (W.H. Smith and Son) it had cost several hundred additional pounds for which compensation should be claimed". Overspend on the project amounted to £201, most of which the council hoped to recover by way of compensation from the contractors.

Generally the scheme was a success, though initially, Dr. Joynes, Medical Officer of Health, reported that 25% of houses were only receiving an intermittent supply, and that Mr Wright, Clerk of the Waterworks, was not testing the machinery as required. Uley was soon connected to the supply to be quickly followed by Slimbridge, Cambridge, North Nibley and Stinch-combe. The local engineering firm of R. A. Lister & Co were given permission to connect their eleven new houses in Roseberry Terrace at the company's own expense and the Reliance Works (J.B. Champion and Son – carpet manufacturers in Long Street) were allowed to abstract water for commercial use at ½d (0.2p) per 1,000 gallons (4.5cu m) per day. At the same time a 90,000 gallon (341cu m) mass concrete reservoir was built on the other side of Whiteway, just below Little Boulton Wood, and this improved provision for residents at the top of the town.

**Ever Increasing Demand (1903 - 1935)**

The next twenty five years saw a rapid growth in both domestic and industrial needs in the district. By 1929 the average daily requirement had quadrupled to 144,000 gallons (655cu m). At the recommendation of Mr H.D.A. Humphrey, consultant engineer from Stonehouse, the well beneath the pumping station was lowered by a further 8ft (2.75m) to increase the capacity of the sump, the yield of which had dropped by 50% chiefly due to a succession of dry summers (11). Many houses in the higher parts of Dursley and Cam often suffered a very reduced supply in the afternoon and no supply at night.

Both the R.D.C. and the Dursley Parochial Committee urgently discussed proposals to augment supplies by taking water directly from the Caswell Stream. The water inspector, Mr S.L. Whittard, estimated that this should yield a potential 100,000 gallons (455cu m) per day and that the scheme would cost £25,000. Though there was some initial public opposition it was




**DURSLEY R. D. C. – SOURCES, PUMPS & RESERVOIRS**

(After D.A. Pearce and N.W. Glos Waterboard maps held at Glos. Archives)

Dursley R.D.C. boundary — · — · —

Springs/wells - sourced prior to 1934
sourced after 1935

Pumping stations – before 1934
- after 1934

Reservoirs – before 1940
after 1940

Fig. 6 (After Pearce Ref. 13)

Fig. 7 Dursley (Caswell) pumping station. After completion in 1935

finally recommended for adoption in July 1931. The arbitrators instructed the Council to pay Mr J.D. Ball £2,000 for the one acre of land needed and that Cam contribute £9,000 towards costs for which they would receive 60,000 (273cu m) gallons per day (12).

In 1932, a further source was developed at Millend in North Nibley to the south of Breakheart Hill (Fig. 6). A spring was tapped and the water was pumped up to the Whiteway reservoir by a 6in (150mm) asbestos cement main. A second reservoir was also built below Tyndale's Monument to improve supplies to North Nibley (13).

Only a few years later the Council, chaired by Ralph Earnest Harrold Esq, began to feel that it was necessary to replace the existing 1902 pumping station which was becoming outdated and that a Joint Scheme should be urgently considered. A replacement pumping station would be built directly over the Caswell Stream which emerged from springs issuing from the Marlstone, some 200 yards (183m) to the west of the existing station. They would yield over 216,000 gallons (982cu m) per day. The Consultant Contractors chosen were A.P.I. Cotterell & Sons of Clifton, Bristol and they brought in the experienced and reputable plant and pump engineers, J.H. Grange & Son of Pately Bridge, Yorkshire (13).

**New Caswell Pumping Station (1935)**

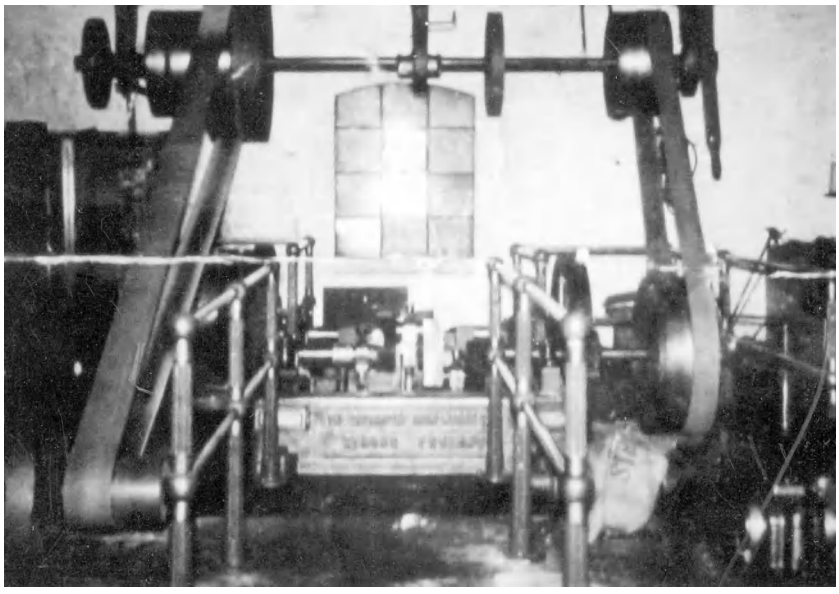


Fig. 8 Dursley Well (Caswell) pumping station (1935). Well head gear driving pumps

The new engine house was constructed in similar materials and to a similar design as the original 1902 building (Fig. 7). Bricks were supplied by the Stonehouse Brick and Tile Company. Two sets of pumps, (Fig. 8) each able to deliver 26,000 gallons (118cu m) per hour, were manufactured by T.H. & J. Daniels of Lightpill, Stroud. These were to be driven by two 4.3 litre, newly designed, water-cooled Type 27-3 diesel engines manufactured and supplied by R.A. Lister & Co (14). Each engine had 3

Fig. 9 Millend pumping station (North Nibley)

cylinders and overhead water-cooled valves and were rated as 30 h.p. (22kW) at 1,200 rpm. They were intended to be run for any 12 hour period and would be started immediately when the float level indicator dropped by more than 3ft (950mm) in the neighbouring reservoir. After testing by the waterworks engineers, Mr F.J. Smart and Mr R.C. Workman the new station was ready for duty.

The official opening took place on Friday 31 May, 1935 (15). The Chairman of the Dursley R.D.C., Mr Harrold, was presented with a golden key by Mr George Grange, the contract manager. On unlocking the main door some of the invited dignitaries entered the hall and one of the engines was started up and run briefly. There then followed various toasts (with glasses charged with spring water?), proposed by Mr E.J. Close, JP., Mr Harrold and the clerk, Mr F.J. Smart. The engineers and consultants were also congratulated for a job well and truly done by Mr W.A. Prout J.P.. Eventually, in the mid-1950's, the diesels were changed for electric motors and the pumps replaced. The old pumping station, Dursley Well, continued to operate for a few more years but was decommissioned in 1953.

**Further Needs and Provision (1945-1965)**

In the mid 1940's the Dursley R.D.C., following a number of dry years, began to have increasing concerns about future requirements, questioning the adequacy of the existing supply network. As a result, Mr T. Ward Whitfield, Chartered Surveyor and consultant engineer, was engaged in 1947, to consider the matter and make recommendations on increasing the supply. In his report (No. 745) to Mr H.A. Pate, Clerk to the Council, he listed all the significant spring reserves in the district. In a further report (No. 806, dated 7 July 1949) he recommended that springs at Ozleworth should be sourced, a reservoir constructed at Breakheart Hill and that a 6in (150mm) main be laid to serve the upper parts of Dursley, Cam and Stinchcombe. Additional pumps should be installed at Leathern Bottle, Millend with a booster at Sandpits. Additional reservoirs should be built at Sandpits, North Nibley, Wotton Hill and Downhouse Farm at a projected cost of £5,475 (16).

In 1948 the Dursley District Comprehensive Joint Water Supply Scheme was split into three distinct areas. These were Dursley, Wotton-under-Edge and Coaley. The Dursley area was being supplied by the 1935 pumping station at Caswell, from Millend and from a connection off the Leathern Bottle reservoir near the A38 north of Berkeley Road.

Early in the 1950's the supply to Stinchcombe Hill was improved by the addition of two elevated steel tanks of 3,000 gallons (14cu m) capacity which were sited next to the Stinch-

Fig. 10 Coombe pumping station (Wotton-under-Edge). Opened 1909

combe Hill Golf Course clubhouse. These were fed from the Dursley system by a manually started ram-pump in Hill Road via a 2in (50mm) main and provided water to the clubhouse and adjoining properties. In 1968 the pump was replaced by a hydro-pneumatic booster. The tanks were dismantled in October 1969 by A.J. & G.L. Boulter Ltd. at a cost of £59 (13).

In 1952 the Council, after considering the various proposals, signed an agreement with the Gloucester Core Water Undertaking to take water from the Leathern Bottle Pumping Station at a cost of £26,765 plus a contribution towards installing a 14in (356mm) main along the A38 to connect with the reservoir at Churchdown (17). A screen protected, vertical slipping induction pump motor of 40 h.p. (30kW), with a capacity of 20,000 gallons (91cu m) per hour was installed to pump the water some 2675 yards (2,500m) up 222ft (70m) to a reservoir at Sandpits, Cam.

In 1953 work was carried out to increase the capacity at Millend (Fig. 9) to 150,000 gallons per day. This was achieved by excavating a further collecting chamber 84ft (25.6m) by 12ft (3.7m) to a depth of 14ft (4.3m) within the bedrock and extending the water source adits. Nott Brodie were the chosen contractors who had the misfortune of having one of their portable diesel pumps fall into the chamber during construction, the resulting fuel oil spillage contaminating the rocks. When finished the work was covered with concrete slabs overlain by gravel and turf. A further building was erected to house the new electrical control equipment to the two submersible pumps and chlorinators. In the early 1960s two new Harland pumps were installed by Jotcham and Kendall Ltd. of Wotton-under-Edge.

Through the intervening years the district's network continued to evolve with the identification of new sources and pumping stations at Coombe (Fig. 10) and Little Tor near Wotton-under-Edge. Further storage reservoirs were constructed at Ashmead near Coaley, Sandpits, Slimbridge, Nympsfield, Crawley, Uley, Breakheart, Far Green and Downhouse Farm (18).

**1965 to Present Day**

In 1965 The Dursley and Wotton districts came under the administration of the newly formed North West Gloucestershire Water Board. Then, in 1974 the utility came under the ownership of the Severn-Trent Water Authority, since when some pumping stations have been enlarged and various mains have been upgraded and extended, but no major schemes have been carried out in the area.

In 1972 the equipment in the original 1902 Dursley Well Pumping Station, which had now been idle for twenty years, was sold as scrap for £20 and the well capped off. The engines went, at first, to the Anson Engine Museum Collection in Cheshire. It is understood that Stroud Museum own one of the engines and it has been on loan to the Bristol Heritage Museum before going to the Hereford Waterworks Museum at Broomy Hill. The well-head frame and pumps and surrounding cast-iron safety posts and rails were removed by Osman Goring and taken back to his mill-works at Coaley. The cast-iron posts have been installed at the entrance to Coaley Mill. The frame and pumps were refurbished before being sold to Hampton Court Castle and Gardens at Orcop near Hereford for inclusion in a water feature which is still awaiting completion.

The 1902 building, has withstood the attacks of vandals and the graffiti artists and is now undergoing major refurbishment during its conversion to domestic use. All the walls have been re-pointed, the roof has been completely re-slated, the well capped-off and windows and doors replaced. In all it has benefited from its sympathetic and thoughtful restoration. It is fitting that it should survive and be given a new use considering the important role it played, more than a 100 years ago, in the development of water supply in the area.

**Acknowledgements**
The author is particularly grateful to D A Pearce who has kindly allowed the use of material and photographs from his unpublished study of the history of water supply in Gloucestershire. He would also like to thank the following for their assistance: Andy Barton, David Evans, David Harris, Adrian Jenkins, Osman Goring, Dr. Ray Wilson and staff at Gloucestershire Archives and Stroud Museum.

**Notes and References**

(1) Goudie, A.S., & Parker, A.G., *The Geomorphology of the Cotswolds,*, The Cotteswold Naturalists' Field Club, 1996.
(2) Richardson, L., *The Geology of Ebrington Hill, North Cotteswolds.* Proceedings of the Cotteswold Naturalists' Field Club, XVI, pp 129-134, 1908.
(3) Public Health Act, 1848, (11 & 12 Vict. c.63).
(4) Public Health Act, 1872, (35 & 36 Vict. c.79).
(5) Gloucestershire Archives (GA), 032294GS, *Whitmore's Almanac for Dursley etc.*, 1901.
(6) Dursley Gazette, 1875-1898.
(7) Western Daily Press, 13 Jan 1899.
(8) Gloucester Journal, 1898.
(9) *Industrial Gloucestershire*; The Engineer, 1904.
(10) Dursley Gazette, 17 January 1903.
(11) Western Daily Press, 4 July 1929.
(12) Western Daily Press, 4 July 1931.
(13) GA, D.A. Pearce, *History of water supply in Gloucestershire*, B547/52313GS, 1988.
(14) Harris, David , personal communication, 2012.
(15) Cheltenham Chronicle, 8 June 1935.
(16) GA, K596/60, *Dursley Comprehensive Water Supply Scheme,* 1947-1956.
(17) GA, K596/60, *Gloucester Core Water Undertaking & Dursley R.D.C.,* 1947-1956.
(18) GA, J18.596/60, *The Geology, Water Supply and Water Resources of Dursley, Gloucestershire*, L. Richardson 1958.

**Other Sources Consulted:**
Records of Severn Trent & predecessor authorities – Glos. Archives (D 10961,11019, 11399).
Severn River Authority – Glos. Archives – Various files, minutes, maps, images & reports.

## APPENDIX Locations of Main Sites Mentioned in the Text

Ashmead/ Downhouse Farm (Cam) ST76729939
Coombe (Wotton-under-Edge) ST76759384
Breakheart Hill reservoir ST75669663
Broadwell (Dursley) ST75739806
Dursley Caswell Pumping Station (1935) ST76589744
Dursley Well Pumping Station (1902) ST76729762
Dursley Gas Works (site of) ST75539906
Leathern Bottle, Cam SO72810066
Little Tor (Wotton-under-Edge) ST76379225
Millend (North Nibley) ST75429665
North Nibley (reservoir below Tyndale's Monument) ST74159571
Rivers Mill (Dursley) ST765978
Sandpits /Woodfield (Cam) ST744992
Stinchcombe Hill (Dursley) ST7497
Stinchcombe Hill Golf Course Clubhouse ST74719803
Whiteway (Dursley) ST76279703
Wotton Hill (Wotton-under-Edge) ST75409380
Uley reservoir ST784984

## TABLE 1 Payments related to the building the Dursley Well Pumping Station and Reservoir (1902)

| | |
|---|---|
| Board of Enquiry costs | £2.40 |
| Well testing fee | £61.31 |
| Public Works Commissioners | £38.60 |
| Advertising | £28.71 |
| Purchase of Engines and Pumps | £850.41 |
| Building of Reservoir and Pipe laying | £2,910.00 |
| Engine House | £522.14 |
| Gas Main installation | £50.00 |
| Private connection to Chestal | £9.16 |
| House connections | £226.48 |
| Fencing enclosures | £27.47 |
| Reinstatement of Damage to Roads | £15.00 |
| Other compensations | £19.31 |
| Engineer's preliminary expenses | £49.98 |
| Engineer's commission | £209.00 |
| Engineer's other expenses | £46.07 |
| Resident Engineers' costs | £203.32 |
| labourer's costs | £245.48 |
| Resulting Road Repairs | £28.62 |
| Reservoir indicator | £4.50 |
| Miscellaneous costs | £0.76 |
| **Total** | £5,548.54 |